The Chemical Age

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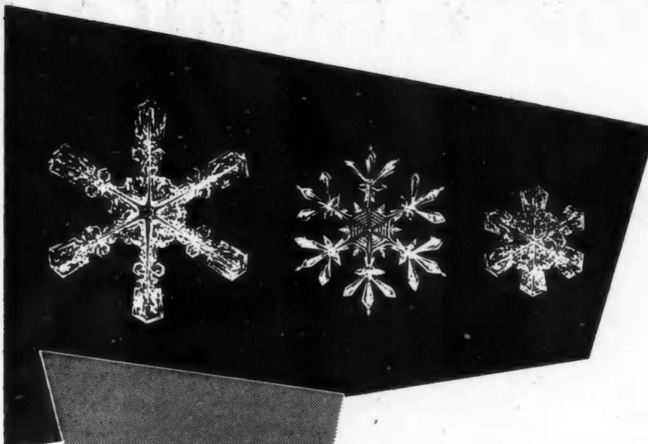

COLD FACTS

No one who has seen an ice crystal under the microscope will ever forget its jewel-like beauty. Such beauty, however, also has practical applications, and the ice-cold refrigerator is now an accepted and essential factor in our everyday lives. Spence Chemicals are doing unobtrusive, but necessary work in many of the refrigerators that hum quietly in nation's homes. Spence Activated Alumina is employed to dry the low-boiling point liquids used in refrigerators, and also to dry out gases and condensation, providing yet another example of the part Spence Chemicals play in everyday life, as well as their vast contribution to a host of industrial processes.

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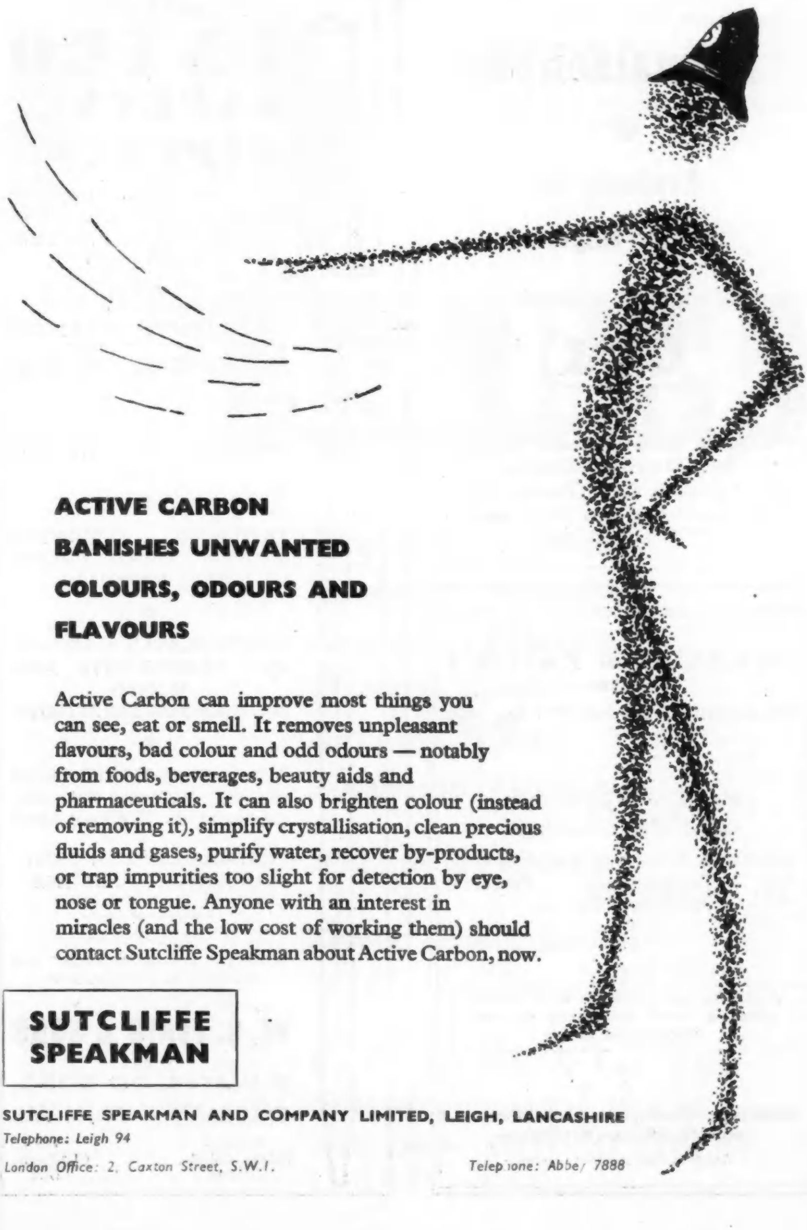

The Chemical Age

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Teeth and Fluorides

IT is just over twenty years since the first realisation that fluorides could prevent or minimise tooth decay. In the town of Sacaton, Arizona, the mottled but carie-free teeth of the Indian population attracted the attention of the United States Public Health Service. The fact that the natural water of the district contained more fluoride than is normal was noted. Two years later another local association between sound but mottled teeth and natural fluoride in the water was observed in a town in Arkansas. Upon these two clues a long-term dental research programme was based and it was eventually proved that traces of fluoride ions in water bring about huge reductions in the incidence of dental caries, especially for growing children. The mottling of teeth is not an unpleasant consequence of this benefit. Mottling occurs only when there is too much fluoride in the water. By artificially adding fluorides to a local water supply the amount can be controlled so that dental decay is prevented without the further development of discolorations. Outside the United States this twentieth century advance in both public health and nutritional chemistry has not so far received as much attention as it deserves.

To-day in America there is enormous public interest in the extension of 'fluoridisation'. By the end of June this year 174 local authorities had either begun regularly to add fluorides to their water supply or had ordered the equipment for doing so. It is estimated that about 1 per cent of the United States water supply is now fluoridised. This figure may seem small but it has been easier for smaller communities to adopt the practice, and towns with populations under 100,000 have tended to take the lead. The total costs involved in adding fluorides to the water supply of a large community, though not greater when reduced to costs per 1,000 gallons, are sufficiently large to cause some hesitation. However, where fluoride additions have been made for a few years, the results in terms of reduced dental decay are already speaking for themselves. It is claimed that fluoridisation reduces the decay of children's teeth by 50 per cent to 65 per cent.

The amount of fluoride required in the water supply is one part per million but it is necessary to control this content within narrow limits. As a cost per person the fluoride bill is very small. As a total national cost it is still very small

when set against national expenditure on dental treatment—in the United States at least a billion dollars per year although only about a third of the population regularly receives dental attention. At present the U.S. Public Health Service is spending 3 million dollars on its fluoridisation programme. To expand the practice of adding fluorides to municipal water supplies national subsidisation of the costs may be urged in the near future.

There is some opposition to fluoridisation as a public service. It is argued that tooth decay is a private health problem; further opposition comes from those who fear that overdose mistakes at water-works might lead to teeth mottling. The case against adding fluorides to public water supplies is to some extent strengthened by a recent development in fluoride application. Coating children's teeth with fluoride-containing preparations achieves similar results. For the past two years children's teeth in 450 towns have been treated in this way under a U.S. Public Health scheme. This method of fluoridisation does not involve the addition of fluorides to water not used for drinking purposes and it also makes the fluoride treatment a matter of private option rather than public compulsion.

In Britain, however, where the nation's dental bill already falls mainly upon National Health Service funds, the economic background to water fluoridisation would seem much more favourable. The complete subsidisation of fluoridisation would probably result in a substantial national saving. This would not be shown at first by annual accountancy but relatively small expenditure on fluorides to-day would slash the national dental bill of 1961 and onwards. The non-financial economics of fluoridisation, *i.e.*, the supply of the chemicals and equipment needed should present little difficulty. In America it has been calculated that the fluoridisation of the nation's total water supply would annually require no more than 45,000 tons of sodium fluoride or 35,000 tons of sodium silico-fluoride. These figures do not exceed present production possibilities in the United States. Britain would require a much smaller tonnage. The type of equipment used is either dry-feeding or, for smaller water-works, a liquid feeder adding a fluoride solution. Spread over 10 years the annual cost for equipment is even less than the annual cost of the fluoride used, an indication that the demand set up for machinery is quite small. It would seem simpler to put one part of fluoride into every million parts of the British water supply than to provide a sufficient number of dentists to give all the population complete treatment and to provide the total number of artificial dentures now needed by those over thirty-five.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 35s. Single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

Notes & Comments

Rewards of Research

THERE has recently been an increasing tendency to impress on the British public, both by editorial articles and by advertising (frequently of high quality), the vital rôle played by chemistry in the everyday life of the ordinary man. Despite these efforts at enlightenment, most people still probably associate the Distillers Co. with its potable spirits section. However, there is no doubt that the prosperous condition of this vast concern, with its multifarious industrial ramifications, owes much of the success revealed in its company report to intensive research and development programmes, which, though costly and sometimes slow to yield results, pay well as a long-term policy. New products such as penicillin and isotopes, unknown to industry before the war, figure in the group's manufactures, while its supply of important chemical raw materials will be considerably strengthened by the recently formed partnership with Anglo-Iranian Oil in the British Petroleum Chemicals project. In the plastics field also much expansion has occurred. No doubt further new products with important potentialities will be developed as a result of its progressive expansion and far-sighted policy.

Chemical Colossus

THE programme of the World Chemical Conclave to be held in New York and Washington from 3-15 September, in celebration of the Diamond Jubilee of the American Chemical Society, would fill a small book. To give some idea of the size and scope of this scientific giant and the rate of its growth, we have only to compare this meeting with the Golden Jubilee meeting of the Society 25 years ago. In 1926 not more than 200 papers were read to the Society. This year not only will over 700 scientists read papers to the American Chemical Society, but over 900 papers will also be read to the 12th International Congress of Pure and Applied Chemistry, which is holding its [illegible]-yearly meeting concurrently with the American Chemical Society and the International Union of Pure and Applied Chemistry. The papers of the American Chemical Society will be read at over 80 symposia held by its 20 different divisions, and the International Congress will hear papers covering 16 different sections. This mammoth programme of a society which has sprung up from a comparative stripling 25 years ago is a fine measure of the growth of American chemistry and chemical engineering, for in that time it has grown to be the largest chemical society in the world. At the World Conclave many famous chemists will be present. These will include Linus Pauling, L. Ruzicka, Sir Robert Robinson, H. J. Eméleus, Louis F. Fieser, F. A. Paneth, Paul Karrer, to name only a few outstanding from among the many hundreds less well known. What they will say and what they will hear will represent the most comprehensive summary of scientific progress in history. For the short space of a fortnight America will be host to the scientific brains of the world.

Chemical Exports

WHEN the present year began it was apparent that the chemical industry, in trying to maintain the high level of exports attained in 1950, was confronted with an almost insuperable task. Shortage of raw materials has for a long time been hampering the fulfilment of overseas orders. High capital costs, in addition to inadequate allowances for wear and tear, impede the necessary replacement of plant, and combined with acceleration of the defence programme present deterrents which might well cause concern in a less healthy industry. Exports of chemicals, drugs, dyes and colours in June were valued at £11,538,248, which was £1,816,225 less than the previous month, but nevertheless exceeded the figures for June 1950 by £3,109,659. Despite all these difficulties the total value of chemical exports for the first six months of this year, according to the *Trade and Navigation Accounts of the United Kingdom* (June, 1951), was £66,256,980,

compared with £47,101,387 in 1950, and £44,540,905 in 1949. In Europe, during the first half of this year, there were considerable increases in overseas trade with Belgium, Finland, France, Germany and the Netherlands while chemical exports within the British Commonwealth (compared with the same period of 1950), included the following increases: South Africa £3,215,461 (£2,195,079); India £4,860,182 (£3,240,901) ; Australia £3,894,657 (£2,768,882); and Canada £2,106,526 (£1,549,010). Despite the obviously keen competition to be expected in America, a remarkable feature has been the increase of chemical exports from a value of £980,053 in the first half of 1949, to £1,277,065 in the same period of 1950, and £5,838,514 this year. Considering the problems with which it is faced, the chemical industry need feel no despondency if the value of its overseas trade declines in the second half of this year.

New 'Chemical Age'

LAST week we had the pleasure of meeting Mr. J. P. De Sousa, M.Sc., the editor-publisher of *Chemical Age*, a new publication which is now being published twice annually in Bombay, India. Mr. De Sousa, a physical chemist, has been on an extended visit to Western Europe and this country inspecting chemical factories and making editorial and advertising contacts. Our Indian sister, we learned, was first published in April 1950, and although only three issues have yet appeared, it already shows signs of developing into a healthy publication. The third edition consists of more than 200 pages and is bound in a paper board cover. Although it has not yet received the support from advertisers that it deserves, it shows signs, when compared with previous issues, that it is gradually winning the recognition it is entitled to as the only chemical process industries journal in India. Contained in it are reports on the 11th annual general meeting of the Indian Chemical Manufacturers' Association, the economic and financial development of the chemical industry in the U.S.A., and the non-ferrous metal industry in India. In addition, there are a large number of technical articles contributed by leading Indian chemists as well as some by British scientists. Issues are published in April and October and single copies are priced in India at Rs.7-8 a copy, the annual subscription being Rs.12. In the U.K. the subscription is £1 and in the U.S.A. \$4. The publishers, The Technical Press, are represented in Britain by A. Vernon Keith & Co., Napier House, 24-27 High Holborn, London, W.C.1 The best of luck to the new venture.

The striking stand of Quickfit & Quartz, Ltd., manufacturers of laboratory and industrial chemical glassware at the British Instrument Industries Exhibition at Olympia recently. Features of the stand were a 200-litre vessel shown (the largest of its kind in the world) and interchangeable ground glass joints

First Stage at Newport Completed

Visitors Inspect Monsanto's New Factory

IN 1936 Monsanto Chemicals, Ltd., decided to seek another site in addition to their long-established Ruabon factory, but it was not until 1946 that the firm were able to complete their construction schedule and to purchase the 140-acre site at Newport. The first ground was broken in June, 1947, and in August two years later, the large detergent plant was started up. Such rapid progress was made that by the late Autumn of 1950 all of the plants included in the first phase of the schedule had been completed and a wide range of chemical products was being produced. Last week representatives of the trade and technical Press were able to visit Newport and see just what has been accomplished.

The new factory is of advanced, yet basically simple, design. While there has been no extravagant waste of space, the plants are well dispersed and within each plant there is an abundance of room for easy operation and maintenance as well as a generous allowance for the expansions envisaged in phase two and three of the long-term construction schedule.

Very few chemical factories in either this country or abroad have been planned with so much attention towards the possible needs of the future. Every one of the existing plants is capable of quick and easy expansion and there is ample room for building new plants for other products and processes. Of particular interest is the stress which has been placed upon the comfort and safety of the workpeople. The Engineering and Development Divisions of Monsanto have accomplished something really worth-while and something of which they can be justly proud.

Production Facilities

The present lay-out is designed for the production of styrene plastic, detergents, oil additives, pentachlorophenol, preservatives, fungicides and chlorinated diphenyls. Although all of these products vary widely in their properties, there are many common factors among the raw materials, processes, and equipment concerned, giving a general unity to the works.

There is, however, a high degree of specialisation within this unity and though considerable use is made of oil products as a starting point in synthesis, other materials play an important part. Chlorine, for instance, is used in large quantities, and so are sulphuric acid and caustic soda. The key factors in many of the processes, however, are the catalysts—some of which are trade secrets.

'Newport 1951'

An apt description of the new factory is contained in the following statement from a commemorative brochure 'Newport 1951' just issued by the company: 'Though production has been rationalised, the Newport factory remains in effect a large-scale laboratory, in which the chemical engineer has expanded the test-tube to contain a truck-load while still maintaining the highly individual techniques and refinements of the original research on which his manufacturing processes are based'.

The factory stands on a level site of roughly 140 acres about two miles from the centre of Newport and within a few hundred yards of the broad tidal estuary of the River Usk where it opens into the Bristol Channel. Docks and railways are nearby and three miles of rail sidings are laid out to serve all main production and service buildings.

All rail wagons are moved by a fireless steam locomotive, the boiler being filled from the steam mains, and a fleet of fork lift trucks is available for moving material from one building to another as well as stacking and shifting them in the warehouses.

Although the factory already represents an investment approaching £3 million, it employs only some 850 employees, for most of the processes are continuous and automatic. The four shift principle is employed over a 24-hour day, seven-day week. For one week in the year the entire factory is closed down and while the operatives are enjoying a holiday the maintenance crews take over.

More than 4,000 instruments are in use to keep the reaction conditions within very fine limits of accuracy. Many of these are built into the actual plant but others are grouped

in the various control rooms. In the largest of these (which is in the detergent plant) the moment-to-moment state of each stage in the manufacturing process is recorded visually on the large indicator boards. Klaxons and flashing lights give warning of the need for personal intervention at any point in the process.

One of the most interesting features of the factory lay-out is the system of overhead pipelines, each line being painted a different colour for recognition purposes. These lines carry the various liquid raw materials from the storage enclosures as well as diesel oil, water, and high- and low-pressure steam.

'Santomerse' Plant

By far the largest plant is the detergent production unit or 'Santomerse' plant which consists of 'tank farm', production section and warehouse. Its overall length is 1,000 feet and it is 150 feet wide. Raw materials are fed in from a system of vats, hoppers and pipelines reaching above the main roof level.

In the first stage of manufacture a synthetic hydrocarbon is prepared with a normal chain structure, and chlorinated at one point in the molecule to permit of further reaction there. In the second stage this chlorinated hydrocarbon is caused to react in the presence of a catalyst with benzene. This reaction is controlled within very fine limits and careful washing and distillation are called for to remove all the by-products and unreacted material. A battery of distillation columns acting at successively higher temperatures is a key part of the plant. The final stage involves treatment with sulphuric acid and then with caustic soda, thus inserting a water-soluble polar group at one end of the molecule and completing the 'Santomerse' molecule. All that remains to be done is to compound and dry the finished product. Drum drying is the method employed.

The 'Lustrex' or plastics plant is the next largest. This is housed in one large building with a tower some 120 feet high. Monomeric styrene is converted into clear crystals or extruded pellets of 17 different colour shades. Air conditioning and built-in vacuum cleaning facilities make this plant a model of cleanliness and the colour control and colour matching department is of great interest.

A three-storey building, 150 feet long by 60 feet wide, houses the oil-additives plant. Materials are distributed by lift from ground-level, and each floor is of open-grill-work to aid ventilation. The essential principle of the multi-purpose design is to break down various manufacturing processes to a series of fundamental reactions—chlorination, sulphonation, neutralisation, etc. Stations are designed for each of these reactions in such a way that they can be linked together in any order required and their working conditions varied at will.

By this system it can produce not only any one of the three additives already scheduled for manufacture, but could be switched at short notice to the making of other similar substances, including those still on the research programme.

The 'Aroclors' plant manufactures chlorinated diphenyls. Benzene is first converted to diphenyl by thermal condensation and chlorine groups are then added under very accurate temperature control, and fractional distillation yields the different 'Aroclors'.

Large quantities of chlorine required by the various production processes are made in an electrolytic plant of advanced design. Brine is passed to the chlorine cell building where it is electrolysed in a long series of cells. This also produces caustic soda.

Chlorination Reaction

The fungicides, 'Santobrite' and 'Santophen' and the wood preservative 'Permasan' are pentachlorophenol preparations and their manufacture is a chlorination reaction.

Five boilers, coal-fired and automatically stoked, supply steam at a pressure of 150 lb. p.s.i. to ring-mains from which it is drawn off to steam-coils, pumps and other equipment. Oil-fired, high pressure water-tube boilers deliver steam at 450 lb. p.s.i. for use in high-temperature distillation columns.

Another section of the factory worthy of mention is the welfare block—a long single-storey building containing the well-equipped medical centre and a large canteen.

A simple but efficient effluent plant ensures the safe disposal of all waste liquors. The liquors are automatically neutralised, run into large settling tanks capable of holding 24 hours' output and then pumped out into the estuary and discharged on the ebb tide.

Production manager at Newport is Mr. G. V. Taylor; the maintenance engineer, Mr. R. J. Blench, and the works manager Mr. Sydney Smith and his assistant Dr. N. B. Dyson.

Britain's Healthy Chemical Industry

Comprehensive Survey in Alkali Inspectors' Report

CONFIDENCE in the ability of the British chemical industry to meet future competition as a result of the wise policy of continually ploughing back a good proportion of its profits, is expressed in the 87th Report on Alkali, &c., Works covering the year 1950, by the Chief Inspector (HMSO, 1s. 9d.).

Despite the many difficulties which it has had to meet, the satisfactory conclusion is reached that the chemical industry is, generally speaking, in a sound and healthy condition.

A total number of 3,550 visits was paid by the alkali inspectors during 1950. 1,887 quantitative analyses were made of gases emitted from the processes in operation and some samples were submitted to the Fuel Research Station and the Government Laboratory. In addition, a conference on Atmospheric Polution convened by the U.S. Ministry of the Interior and held in Washington was attended during May, and a report is to be issued.

While in America, the Chief Inspector took the opportunity of visiting St. Louis and Pittsburg with a view to studying the smoke ordinances in force in those places and to discussing their operation. He was able to visit several refineries and works owned by the Standard Oil Co. and the Chemical Corporation of New York.

American Ordinances

In America, there is no Federal legislation on atmospheric pollution, each city, county or state making its own appropriate regulations. Most ordinances are based on a common pattern, however, and include regulations such as those following:—

(1) Dense smoke emission from either industrial or domestic premises is prohibited.

(2) Dense smoke is defined in relation to the Ringelmann scale (usually of a density equal or greater than No. 2 Ringelmann).

(3) Some relaxation is allowed in the case of certain special industries, locomotives, tugboats, etc., or when building up or remaking fires.

(4) The sale, transportation or use of solid fuel other than smokeless fuel is prohibited unless it is to be burned in a mechanically operated plant of approved design.

(5) Smokeless solid fuel is defined in relation to its volatile matter content (usually not more than 23 per cent).

(6) Building of new furnace installations or reconstruction of existing furnaces is subject to prior approval of the plans by the Smoke Commissioner.

(7) New or reconstructed furnaces must not be operated without an operating permit having been secured.

(8) Emission of fly ash in concentration greater than 0.8 lb. per 1,000 lb. of waste fuel gas is prohibited.

(9) Appeals against decisions of the Smoke Commissioner may be lodged with an Appeal Board.

Smoke-consciousness appears to be increasing in the U.S.A., and measures dealing with it have widespread support.

Few Infractions

Of the factories visited in Great Britain, a total of only 65 infractions of the regulations was recorded, none of which were deliberate evasions, and no legal proceedings have therefore been taken.

The rate of production in chemical industry is described in the report as high, output having been to the limit of plant and labour available. Benzole recovery at gas works, however, has been limited due to maintaining the volume and calorific value of gas supplies; pitch exports have been reduced; and sulphuric acid is, of course, short.

Zinc production has been very high, but despite every effort has failed to satisfy the rising demand. Tin mining in Cornwall has increased, and coke ovens have been working to capacity, although there are some old ovens that are becoming uneconomic.

Existing chemical works have been well maintained and in many cases substantially extended. Several large new works are nearing completion and yet other projects are in hand or contemplated. The chemical industry, like others, has suffered from shortage of constructional materials and has experienced difficulty in recruiting suitable labour, and the tendency has been to install automatically controlled plant provided

with all possible labour-saving appliances.

Better planning of process buildings, good roadways and the setting out of grass lawns and flower beds have not only produced more attractive conditions for the workpeople but their provision has resulted in more careful operation and greater cleanliness with a consequent improvement in the general amenities of the districts in which the works are situated.

Visits to spoilbanks were 122 in number. In several places underground stowage of dirt is being experimented on, and valuable experience of costs and difficulties of the process is being gained.

Among the unregistered processes, grit emission from steam-raising plants and electricity generating stations has been the subject of further investigation, and measures aimed at reducing it in the former have been mainly successful, the eventual electrification of the collieries in question being the long-term preventative.

Emission Decreasing

Regarding the generating stations, the report points out that grit emission will decrease, in spite of the continual expansion taking place (the annual rate of 30 million tons of coal burnt is increasing), since the greater amount of grit arises from the older and less efficient stations which are being progressively less used as new plant becomes available. Financial saving lends incentive to this replacement. Large amounts of sulphur dioxide are discharged from fuel-burning appliances, but power stations are only responsible for 17 per cent of it (28 per cent in London).

Emission of fluorine compounds has been troublesome from steel works and from frit manufacture. No substitute for fluospar as a flux in smelting has been found, but there have been indications that the amount may be reduced, especially when the modern method of 'lancing' the steel furnaces with oxygen is practised. Cooling waste gases to below the dew point removes much of the fluorine, but this is difficult as their volume is very large, and corrosion would be serious in any cooling plant.

Of the registered works, eight alkali works exceeded the statutory limit for HCl in discharged gases, but in most cases this was easily located and remedied.

Cement works have been operating at full capacity during the year due to great demand. The fact that comparatively few complaints concerning them have been received is therefore encouraging, and indicative of the good effect of the progressive installation or reconstruction of dust arrestment plant in areas of intensive production. Electrical precipitators, although expensive, are still the most favoured means of dedusting kiln gases. The banks of the Thames, however, are likely to continue causing complaint, in spite of over 20 precipitators in place, owing to the very intensive production there.

The smelting of ores—of which the principal one is zinc blende, the remainder being copper, lead and nickel, and antimony, tin and molybdenum on a smaller scale—has not given rise to any serious pollution. The maximum acidities occur during the blowing stages in copper smelting, but the height of the chimneys prevents complaint. Sulphur recovery is an unattractive proposition here and is not practised except at zinc works and a few others, which have a form of gas cleaning plant. If operations were on the same scale as in some of the U.S. or Canadian smelters, further measures would be necessary.

Sulphuric acid production for 1950 was 151,000 tons in excess of that in 1949, and only two complaints arose from the lead chamber type of works. Contact acid plants will find it hard to operate in face of the growing shortage of brimstone. Average discharge to the atmosphere for the year decreased slightly compared with the previous year.

Ammonia Plants

Operation of plants for the production of concentrated ammonia liquor and of liquor ammonia has been reasonably satisfactory, although there have been the usual difficulties in connection with severe corrosion, choking of pipelines, and so on. There has also been some cause for dissatisfaction regarding the condition of plants, but only two were deemed to be sufficiently serious to class as infractions.

There has been a decreased concentration of nitric acid in the gases escaping to atmosphere from ammonia oxidation plants, with only two infractions noted.

Regarding arsenic works, only 19 works were registered in 1950, compared with 54 in the peak year of 1910, when there were 33 works in which arsenical soot or white

arsenic were obtained from the calcination of tin ores—almost entirely in Devon and Cornwall. Today only one of the 33 remains in operation.

Production of arsenious oxide in Great Britain, which until 1902 held first place among producing countries, is now small. In all cases, however, means are installed for dealing with possible arsenical emissions.

As is well known the oil refining capacity of the country is in process of great expansion. Some of the increased capacity has already come into production, but the bulk of it is still in the constructional, or, in some cases, in the drawing board stage.

Odours from oil distillation and cracking processes are very objectionable and unless great care is exercised, complaint, often over a wide area, is almost inevitable. Discussions with the interests concerned have continued and have been extended.

The problem of dealing with the gases from the operations involved is a major one. There is no doubt as to the first stage: the 'best practicable means' for dealing with the highly malodorous foul-gas both from the view-points of smell destruction and fuel economy is combustion. The evil-smelling sulphur compounds are thereby converted into SO_2, which is relatively harmless when discharged in a dilute enough state.

Causing Concern

The oil throughputs now under review, however, involve total weights of sulphur dioxide which must cause some concern. Although it is likely that much or all of the hydrogen sulphide removed from process gases by techniques of the Girbotol, etc., type will now be recovered as sulphur or as sulphuric acid, and that emissions due to the burning of acid sludge will be less than at one time feared, there will still be a heavy tonnage of sulphur dioxide discharged to air in concentrations such as to render recovery economically impracticable.

The inspectors have, therefore, in their discussions with the interests concerned—all of whom have been very co-operative—had to consider chimney heights as a means of ensuring adequate dispersal and probable ground concentrations of sulphur dioxide well below the threshold likely to be harmful.

A modern oil refinery comprises many units, each of which may have its own chimney, so that the problem of chimney heights becomes extremely complicated. It has been necessary to take into account not only the probably daily mass emission of sulphur dioxide from each chimney and its likely concentration, but also the orientation of each chimney relative to all other chimneys on the refinery. The theoretical consideration on which calculations of the probable ground concentrations are based, refer to ideal conditions which do not obtain in practice, e.g., a level terrain and a constant wind. These departures from the ideal must therefore also be taken into consideration.

Zinc Retort Trials

Results of an exhaustive trial of a modified method of operating zinc retorts at one works have not been good, and it has been decided that the experiment must be discontinued. Other experiments are, however, continuing, and there is reason to think that an effective means of reducing the fumes emitted during the production of zinc will yet be developed.

Trials with machine-made condensers have also proved disappointing, the cost in relation to life comparing unfavourably with hand-made condensers.

The liquidation of zinc ashes, galvanisers' drosses, etc., to recover zinc is a process falling within the scheduled definition of a zinc work and is registrable. It is therefore necessary to devise practicable methods for treatment of the fumes which arise in the process. These fumes contain zinc chloride and ammonium chloride particles in suspension and are persistent, corrosive and intractable.

Experiments are being initiated with a view to establishing the possibility of either (1) removing the soluble zinc and ammonium chlorides by washing the material with hot water before liquidation, or (2) removing these constituents from the fume by scrubbing, aggregation or filtration.

The number of registered benzene works in Great Britain has now fallen to 399, compared with 486 in the peak year of 1945, and 311 in 1938. While plants at coke ovens have generally been in full use, the operation of those at gasworks has been intermittent, or at a reduced rate of extraction. Operations at pyridine works have on the whole been well conducted, and hydrofluoric acid works have caused no complaints.

American Newsletter

INCREASING interest in the chemical industry is being taken by Phillips Petroleum Company, which is planning a wide range of projects in the chemical field. These include the building of a plant in West Texas to extract 250,000 lb. of sulphur daily from sour natural gas, with the possible construction of a second plant on another location. Increasing output of ammonia is also scheduled, which together with the additional sulphuric acid from the sulphur plants will help to meet increasing demands for fertilisers. Operations in the field of synthetic fibres are to be greatly enlarged, and a 50 per cent increase in the plant capacity of its carbon black production, is part of the programme. According to its president, Paul Endacott, the $700 million dollar company, which already operates the Government-owned butadiene and synthetic rubber plants at Borger, Texas, is also to operate the Atomic Energy Commission's materials-testing reactor now under construction near Idaho Falls, Idaho.

* * *

PETRO-CHEMICAL plant, valued at $3 million, for the production of isopropyl alcohol and acetone is to be built in Montreal by the Shell Oil Company of Canada, Ltd. The new plant, which will initially produce about 20 million lb. annually of the two industrial chemicals, is expected to be completed during the second half of 1952. It will adjoin the company's present Montreal East Refinery.

* * *

OIL extraction from oil shale by means of a new gas-combustion process has recently been developed in the U.S.A., and a contract for the design and construction at Rifle, Colorado, of a demonstration-scale retort has been awarded to the Chemical Plants Division of the Blaw-Knox Construction Co., Pittsburgh, Pennsylvania. The new plant, with a capacity range of 150 to 400 tons of oil shale daily, is based on a pilot plant capable of 6 tons a day, which proved the efficiency and economic value of the new method. Two important features of the process are, first, that it produces and uses as a source of heat for retorting a low BTU gas obtained from the shale and burnt in the presence of air, and second, that it requires neither water nor air, nor any elaborate system for condensing the liquid products which come from the retort in the form of a mist. The demonstration unit, which will provide technical data for the design of commercial plant, is expected to be in operation in about a year's time.

* * *

NEW plant and the expansion of its existing works in order to increase aluminium production is planned by the Reynolds Metals Company, one of the three main firms in the American aluminium industry. Arrangements have been made for a loan of $85 million which will be used for the construction at Corpus Christi, Texas, of an aluminium reduction plant with a capacity of 150 million lb. a year, and a 175,000 kW gas diesel power plant; also for additions to its existing works at Jones Mills, Arkansas and Troutdale, Oregon. Primary aluminium capacity is expected to be raised by about 44 per cent bringing Reynolds' total to approximately 650 million lb. annually, or about 27 per cent of the nation's requirements. The new plant is expected to start operations early in 1952.

* * *

DEVELOPMENT of a new metal treating chemical process, said to extend greatly the lubrication limits in the cold working of steel has been announced by the Pennsylvania Salt Manufacturing Co., and the Heintz Manufacturing Co., of Philadelphia. The new method, known as the Pennsalt Foscoat process, produces a heat-resistant lubricating surface which chemically interlocks with steel and is said to have exceptional adherence even under the most severe working conditions. Substantial economies are claimed in various operations through the elimination of intermediate pressing, annealing and chemical treating stages; increased production from existing equipment; reduced consumption of chemicals because of compatibility and savings in metal by the reduction of scrap losses incurred under former methods.

Work of the BCURA

Study of Coal By Physical & Solvent Methods

MUCH valuable work was carried out by the British Coal Utilisation Research Association last year. Establishment of the association, which has now completed its 13th year, on the conjunction of interests of the coal producers, distributors, appliance manufacturers, and coal consumers, has indeed proved well conceived, and shown the value of a free and common ground which an autonomous co-operate research association provides.

The pattern of the association's research programme, as shown in its annual report for 1950 now available, has been designed with a view to securing the earliest and greatest possible progress towards solutions of the most urgent problems of coal utilisation.

Main lines of investigation in the chemistry department at Leatherhead were: studies of coal by physical and solvent methods; the production of zircon stator blades for gas turbines (undertaken for the Ministry of Supply); completion of the tar distillate programme; and attempts to develop new (non-fuel) products from coal.

Characterisation of coals by their swelling and extractability in ethylene diamine has been explored and standard methods for testing have now been laid down. Briefly, these methods comprise a 48 hr. Soxhlet extraction and the measurement of solvent imbibed, and amount extracted, at room temperature. The method requires only the simplest apparatus and the technique is readily learned. Measurements made show a definite correlation with rank, and can, to a limited extent, be used to distinguish petrological types.

Flotation Methods

Methods for separating petrological constituents to facilitate their individual examination by solvent techniques have been investigated: both density and froth flotation methods have been applied to a grey durain, with encouraging results. It appears likely that separation of a durain into perhydrous spore material, orthohydrous vitrinite and subhydrous attritus (or micrinite) may be achieved when the two methods are used in combination.

A study of the mechanism of extraction by solvents has led to a better understanding of the physical and chemical nature of coal, and the examination of extracts in solution by electrophoresis, chromatography, partial precipitation and similar methods has yielded further information.

Results are consistent with the micellar model of coal structure put forward by Bangham and others, but modifications that take into account the size distribution of micelles, different degrees of interlinkage and the presence of a small proportion of material of fairly low molecular weight are necessary. Recent work has emphasised the significance of the oxygen content of the coal substance. Attempts are now being made to translate these general statements into more precise numerical form.

X-ray Scattering Technique

Samples of the vitrinites (the bright and principal constituents) of a number of bright coals have been examined by the X-ray scattering technique. A fundamentally similar molecular structure appears to persist over the range of coals examined (nine coals, 78-94 per cent carbon content). The observations are not inconsistent with the micellar theory of coal structure; thus low angle diffuse scattering resulting from the pore structure is prominent: in addition, certain features of the scattered intensity curves appear to parallel the Seyler reflectance steps.

The presence of a γ band, claimed by previous investigators, has not been confirmed. As yet, it is not possible to decide for or against the graphite-like crystallite structure. The existence of a proportion of loosely bound oxygen of constitution is indicated by the constant type of curve obtained over a range of caking coals in which the oxygen content varies considerably.

Development of zircon as a refractory material has reached a satisfactory stage, and it is hoped that any further activity will be taken over by industry. Zircon turbine blades were completed early this year, but have not yet been tested by the staff of the Royal Aircraft Establishment. The blades were made by extrusion in a specially

designed press giving equal rates of extrusion over the cross-sectional area of the blade.

Improved products of the type described in the last report—high duty refractories, porous refractories, etc.—have been made with the assistance of coal-solvent materials. Products already manufactured in the laboratory will be offered to industry for development as circumstances allow.

Phenanthrene Conversion

Laboratory scale work on the oxidation of phenanthrene is now approaching completion. An outstanding development has been the conversion of phenanthrene in promising yield (55 per cent of theory) to phthalic anhydride, which is in great demand in the plastics and paint industries; a charge of 10 gm./hr. together with an excess of air is made to fluidise a 1-2 in. dia. bed of silica-vanadium pentoxide microspheres at about 450°C. Some further experiments on a rather larger scale (about 250 gm./hr. in a suitable development laboratory would be desirable to establish optimum conditions that could be used in designing pilot plant; the yield under these conditions would probably be higher than has been achieved in the small-scale apparatus.

Attempts to make diphenic acid—a valuable substitute for phythalic acid—were unsuccessful, but did reveal that under suitable (milder) conditions a wide range of potentially useful aromatic acids and other oxygenated compounds can be obtained; among these one, the lactone of 2-hydroxy-diphenyl-2-carboxylic acid (the best yield so far is 44 per cent), has been definitely identified. This substance is likely to be of interest in plastics manufacture. The work also led to an insight into the course of the oxidation reaction.

A body of information has been built up in the course of studying the catalytic reactions of alkyl phenols and it is now known how the products vary with such reaction conditions as rate of flow, proportion of steam added, etc., and with the nature of the alkyl groups; the direction and extent of isomerisation has also been established.

Survey has shown that a silica-alumina catalyst is the best; it requires for optimum results a temperature of about 380°C., a space velocity of 0.5 $hr.^{-1}$ and the addition of 20 per cent by weight of steam. Under these conditions the conversion per pass is about 20 per cent to dealkylated products and about 15 per cent to isomers, with little loss as coke and tar. Methylphenols are dealykylated by disproportionation: *e.g.*, a cresol gives equivalent amounts of phenol and xylenols.

Relationships reported earlier by Seyler regarding the stepped nature of the optical reflectance of coal species have been very actively studied. Two additional complete Berek photometers having become available, five vacation workers spent a period studying the technique and making observations to test previous findings. The great number of observations made by them have verified the existence of the reflectance steps, and an information circular presenting the results is now being prepared. The newly introduced technique of using coated objectives has proved most effective in the microscopy.

Principal tasks in the physics department were the sampling and size determination of dust in flue gases, and the assessment of the grindability of coal.

During the year seven coke fired Downjet furnaces have been installed in industry for various purposes including low temperature drying, the firing of pots in glass making, and the production of CO_2 and heat for a chemical process; in the latter application the Downjet coke burner was employed because of the high CO_2 content of its flue gas. In the case of the pot firing application the users have reported a coke consumption of 11 tons per cycle for six pots as against a coal consumption of 21 tons in an existing hand-fired kiln for four pots. The small attention required by the Downjet burner is an attractive feature in respect of many applications.

Automatic Control

Objectives of the gas producer department had been to devise new methods of automatic control of producers and to investigate their operation by full-scale trials; to study by small and full-scale experiments, the operation of fuel beds in producers especially as affected by devices such as leveller bars, etc.; prepare a programme and begin work on the gasification of low grade fines and slurries.

Development on a rational basis for the automatic control of mechanical producers is well advanced at the steel works of Baker & Bessemer, Ltd., in collaboration with both this company and George Kent, Ltd.

SCI's Annual Dinner

A Distinguished Gathering in London

MANY distinguished guests, prominent in the chemical and allied industries both at home and overseas; attended the annual dinner of the Society of Chemical Industry held at the Dorchester Hotel, London, on Wednesday, 11 July, when the president, Mr. Stanley Robson, presided.

A 'token' installation was performed of the president-elect, Mr. John Rogers, chairman of Imperial Chemical Industries, Ltd., on whom the presidential chain and jewel were bestowed. He returned them almost immediately, however, to Mr. Stanley Robson, whose term of office as president continued until Friday 13 July, when the meetings marking the 70th anniversary of the society came to an end.

Principal guest of the evening was Air Chief Marshall Sir Roderic Maxwell Hill, K.C.B., M.C., A.F.C., A.D.C., Rector of the Imperial College of Science and Technology, who apart from his distinguished flying career, has held a number of technical appointments including Director-General of Research and Development at the Ministry of Aircraft Production, and Controller of Technical Services in the British Air Commission, Washington.

Proposing the health of the society, Sir Roderic said he welcomed the opportunity because its president, Mr. Stanley Robson had recently been elected an honorary Fellow of the Imperial College of Science and Technology, and also because the college had had the privilege of providing a headquarters for the society during its London celebrations in the Festival of Britain.

Scope of the SCI

One was impressed, continued Sir Roderic, by the wide range of interest within the organisation and membership of the society. From the great variety of industries with which it was connected, one might well conclude that every important industry was a chemical one.

The society was closely associated with the universities, learned and technical societies and technical colleges up and down the land, and one could hardly over-estimate the value of the function which it performed in forging the bonds that brought together the industrialists and scientists to discuss their problems and exchange experience.

Those linkages all along the advancing front of science and industry were becoming increasingly important. It was the strength of those linkages which gave effective power to the concentrations of knowledge and practice which were called specialisation.

The Chemist's Bond

'Bonds' was a word which conjured up ideas, not only in the mind of the financier, but also in that of the chemist, to whom it meant something very special. That train of thought might lead to the idea that there was some resemblance between the work of the Society of Chemical Industry and the natural architecture and construction of molecules, which, incidentally, the chemists and chemical engineers were learning to imitate and indeed to improve upon.

It was natural, said Sir Roderic, that they wanted to make in the laboratory the things related to the primary needs of man, such as food and clothing and the means of combating disease in plants, animals and human beings.

Sir Roderic drew an analogy between the architecture of the society and nature's architecture and building processes. That analogy, he said, was rather fascinating and was helpful in constructing the various industrial associations and bringing together the various fields of research, experiment, development and manufacturing operations.

Nature's economy in building from few elements such amazing structures, and the way in which she managed processes with unparalleled accuracy was truly impressive. The same could be said of the operations of the society.

Speaking of the strong connections between the society and the Imperial College and other scientific educational centres, the president, in his reply, recalled that in 1883 Sir William Perkin, who was to become in the following year its fourth president, proposed the toast, coupling with it the name of its third president, Mr. Walter Weldon.

Sir William had said: 'The debt which our chemical industry owes to Sir Henry Roscoe (the society's first president), from

the position he has for so long given to chemistry in the curriculum of the great educational establishment over which he presided in Manchester, could scarcely be over-stated. But the time would come when all chemical industry would owe to him a still greater debt for having brought the Society of Chemical Industry into being.'

One would like to think, said the president, that the society had lived up to that. Sir Henry Roscoe was a very great man indeed, and Sir William Perkin was one of the greatest chemists this country ever produced.

Link with U.S.A.

The society was proud of its wide interests and its association with leading members of the chemical profession overseas. From the early days of its formation the society had always had close relations with friends in the U.S.A. The badge of office which he wore was indeed an adequate testimony of that, having been presented by the society's American section.

Proposing 'The Guests,' Dr. Leslie H. Lampitt, past president and honorary foreign secretary of the society, said that as the gathering was composed of so many distinguished guests he would refer to them in categories, rather than individually.

They had with them representatives of three great research organisations of this country—the Department of Scientific and Industrial Research and the agricultural and medical research organisations.

Among their friends from overseas were members of the free nations in Europe, represented by guests or members of the society, from Norway, Sweden and Denmark, the Netherlands, Belgium, Luxembourg, France, Western Germany, Italy, Spain and Switzerland.

In conclusion, Dr. Lampitt coupled with the toast the names of Professor E. D. Adrian, president of that 'mother of societies,' the Royal Society, and Professor A. W. K. Tiselius, vice-president of the Nobel Foundation.

Science must be considered as a means as well as an end, emphasised Professor Adrian in his reply. The activities of the chemists and chemical industry advanced knowledge and in so doing improved nearly every aspect of everyday life. It was good to know that the SCI was looking after the uses of chemistry as well as its structural form.

Professor Tiselius, expressing his thanks, paid a tribute to the wealth of new ideas and initiative which came from Great Britain. It was a great experience to be present at the society's dinner, he said, and to have the chance of renewing old friendships and making new ones.

The toast of the London Section was proposed by Dr. David Traill, and responded to by Dr. A. C. Monkhouse, chairman of the London Section, who said that the formidable job of organising the 70th annual meeting had been begun more than a year ago. He paid a well-deserved tribute to the many willing helpers who had combined to make the occasion a success.

First there was the Section's indefatigable secretary, Mr. Streatfield. Others included Sir Wallace Akers, chairman of the finance committee and his hard-working treasurer, Dr. Kent-Jones; Mr. Peter Norman and Mrs. Bush who had edited the handbook; Dr. Cox and Mr. Soper, respectively chairman and secretary of the lecture committee, and Dr. Cameron who had been responsible for tours and visits.

Overseas Guests Honoured

Honorary membership of the society was conferred by the president on the following representatives of chemical industry overseas, who were introduced by Dr. Lampitt:—Professor E. W. Berner, (Norway); Professor P. Karrer, Switzerland); Professor H. R. Kruyt, (Netherlands); Professor A. W. K. Tiselius, (Sweden); Dr. A. Wilhelm (Switzerland).

Courtaulds in U.S.A.

FORMATION of a new wholly-owned subsidiary company in America, to be known as Courtaulds Incorporated, was announced on 18 July, by Courtaulds, Ltd. Plans are stated to be well advanced for the erection of a factory to produce 50 million lb. of viscose rayon staple a year.

Site of the new factory, which it is estimated will cost about £3½ million, is located at Huntsville (Alabama) according to a Reuter message. Permission to build the plant was granted by the National Production Administration, and the site was selected by Lustre Fibres, Inc., of New York, American sales agents of Courtaulds.

Instruments for Chemical Plant

Part V—Telemetering, Control Panels & Graphic Control Desks

ONE of the most outstanding developments in instrumentation for chemical plants during the last decade is the wider use of telemetering methods, either for remote indication or recording of process factors, or, a recent development, for centralised remote plant control. The latter takes the form of central control instrument panels, of graphic indicating panels for measurement only, or of fully automatic graphic control panels, having a graphic flow sheet of the process incorporated with small inserted indicating or recording control instruments.

The reason for recent developments of graphic control desks or panels has been that sometimes the number of instruments on a standard panel becomes excessive, and the size of a large panel requires much space. Instrument designers have now got busy in developing very small control instrument units to be fitted into the flow sheet. Some new designs take up little room, usually one-third of the standard type receiver controller on an ordinary instrument panel.

Remote indication or recording or automatic control methods use either pneumatic impulses from a detecting element within the plant, or pneumatic-electric or pneumatic-electronic transmission methods. Fig. 1 illustrates diagrammatically a pneumatic transmitter for remote recording of rate of flow values. Electrical remote indication

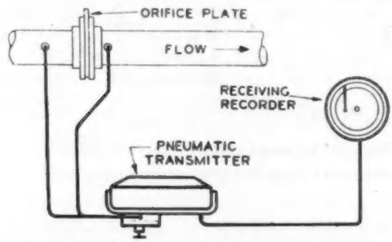

Fig. 1.—Pneumatic transmitter for measuring flow by means of the orifice method (*Courtesy of Electroflo Meters Co., Ltd.*)

uses a primary instrument, usually called a 'transmitter,' which operates a secondary instrument, called a 'receiver,' through pilot wires. Sometimes the word 'repeater' is used instead of 'receiver.'

Fig. 2 illustrates a typical electronic-pneumatic telemetering control system. Plant instrument 'A' is connected by cable to a relay unit, and to a 'confirming transmitter' on the pneumatically or electrically-operated large control valve. 'B' allows adjustments to be made.

Pneumatically remote systems are mainly used in America, and find wide uses in chemical and oil plants. Remote operation is, however, limited to about 1,000 yards. In this country it is considered advantageous

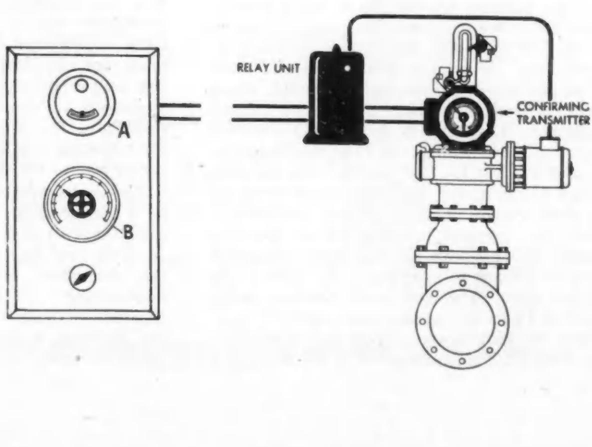

Fig. 2—Remote control system (*Courtesy of Evershed & Vignoles, Ltd.*)

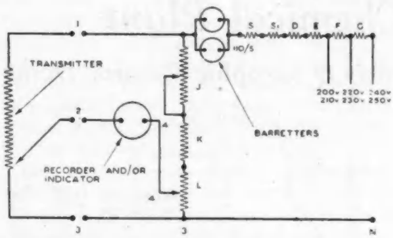

Fig. 3—Typical circuit for A.C. of remote pressure transmitter (*Courtesy of George Kent, Ltd.*)

to employ D.C. electric circuit for piloting, and sometimes a special transforming unit is employed to transform electric impulses into pneumatic control action.

Messrs. George Kent, Ltd., of Luton, have recently produced a multi-point, air-operated receiver-recorder for use in these circumstances. It provides a synchronised side-by-side record of the principal measured or controlled variables in a system. It can be used in conjunction with a transmitter mounted in any of the firm's standard instruments (mercury or ring balance types) for flow, such as Multelec potentiometers, pressure or temperature controllers; or with transmitters of other makes provided that they emit the required pressure range. All the components of the receiver are standard, the bellows unit, which is essentially a pressure gauge, comprises standard components largely as used for the Kent Mark 20 air-operated control unit.

Three Zone Chart

The receiver records on a chart divided into three distinct zones, and can operate on 3, 4, 5 or 6 points. When it is operating on one zone, different coloured inks are used. The pen travel is 3 in. for each point. Each pen is provided with a separate 'zero' adjuster. The chart is driven by a synchronous electric motor, and at the standard speed will last for two months. To facilitate chart-changing the chart roll is mounted on a drop-frame. The instrument includes an air-filter, pressure-reducing valve, moisture sump and pressure gauge. Air connections are by unions to nipples on the side of the meter case. The system air pressure range is 3 to 15 lb. per square inch, and the maximum working distance from the transmiters is 1,000 ft. The mechanism is mounted in a cast-aluminium case which is suitable for wall or flush panel mounting. The dustproof door seals on a rubber joint and is fastened by two locks embodied in the handles. Fig. 3 shows a typical A.C. circuit for a remote pressure transmitter.

The Kent Pressure Transmitter consists of a bourdon tube or bellows-operated unit housed in a fabricated steel case heavily enamelled, suitable for wall mounting. The movement of the bourdon tube or bellows is transmitted by link and lever to a contact arm which moves across a resistance coil. This resister is immersed in an oil bath to lubricate the contact and protect it from dust and dirt.

The resistance coil is fed with an electrical supply through a separate mains unit which maintains a constant voltage value in the circuit. This mains unit consists of two barretter lamps and a shunt circuit. The barretter lamps are of the 1/H type with iron wire filaments enclosed in a hydrogen-filled envelope, so designed to provide a constant current to the shunt circuit irrespective of normal variations in the supply voltage.

Current and Pressure

The value of the resistance coil varies in accordance with the position of the contact arm, that is, in accordance with pressure. As the other resistances in the circuit are constant the current is proportional to the pressure and is indicated and recorded by milliammeter type receiving instruments.

All indicators and recorders employed in the circuit are connected in series and ballasted-out to give full scale deflection for the full circuit voltage drop, by the addition of resistance. The proportion of resistance with a zero temperature coefficient, represented by this additional resistance, and the instrument windings is such that any errors due to ambient temperature variations are negligible. Two adjustable resistances are provided in the circuit, one for adjusting the zero reading and the other for adjusting the maximum reading.

This instrument converts the E.M.F. given by a thermocouple (or other small electrical measurement) to a pressure of 1 to 5 lb. per sq. inch, and, like the Low Pressure Amplifier, furnished ample force for operating mechanisms. Temperature is indicated, recorder or controlled by a pressure measuring element without detracting from the initial accuracy.

Briefly, the design of this converter is such that the position of the pointer of an electrical movement positions a load on a cantilever so that the load at the free end is a function of the E.M.F. applied to the movement. This load at the free end of the cantilever is opposed by a pressure and the system is arranged so that the two forces are continually balanced. In this way the pressure in the system is such as to provide ample operating forces for the employment of air-operated controllers.

Going into detail, the electrical galvanometer is calibrated to deflect from a point A to a point B for the range of the instrument. The pointer is allowed to swing quite freely between two parts, one of which is a chopper-bar which rises and falls due to the rotation of a cam—on the shaft of a motor—and clamps the pointer between itself and the cantilever, thus loading the latter with a predetermined load due to the reaction of a spring. The end of the said cantilever acts upon a pallet, which is an optical flat and is positioned above a nozzle in the mechanism.

Compressed air from a small compressor or works supply is fed to this nozzle through a restriction. From the nozzle is tee-ed off a line connected to the associated instruments; in this line is a shut-off valve. The operation is as follows: When the chopper-bar is in the high position, the pointer of the galvanometer is free to take up a position proportional to the E.M.F. from the thermocouple. On the cam turning to the low position, the pointer is clamped between the chopper-bar and the cantilever. The loading pressure from the spring is thus located on the beam at the point dictated by the free position of the pointer at the moment of clamping. It will be understood, therefore, that the beam supports a concentrated load whose position depends upon that taken up by the pointer at the time it becomes clamped to the chopper-bar.

No Danger from Fumes

Another remote pneumatic control method is shown in Fig. 4. Bristol's Metavane System of Pneumatic Telemetering provides a simple, accurate method of measuring flow at any point in a plant or process and transmitting the value pneumatically to some distant, central point where it can be either recorded, indicated, or automatically controlled. In view of the fact that air under pressure is used throughout for power, this system of Telemetering is particularly well suited for use in plants where explosive fumes are present. Complete safety in hazardous atmospheres is assured.

The Metavane System consists of two instruments: the transmitter and the receiver. The transmitter measures the variable in question, indicates its value on an indicating scale for the use of the operator, and transmits the reading to the receiver located at a

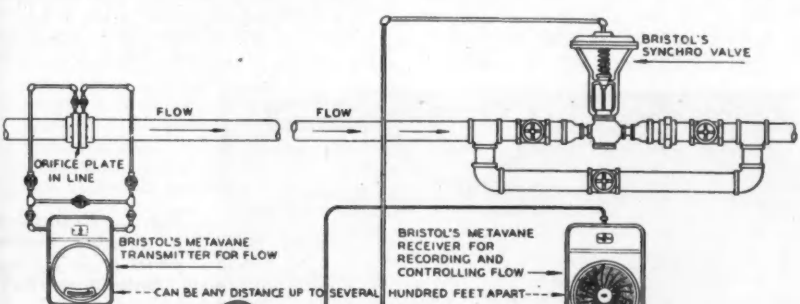

Fig. 4.—Bristol Metavane flow controller for remote recording *(Courtesy of Bristol's Instrument Co., Ltd.)*

remote point, which may be several hundred feet away. The two instruments are connected together by means of tubing. A 15 lb. air supply, introduced at the transmitter, provides power to the telemetering system.

Air Pressure Controlled

The transmitter is essentially a Free-Vane Pressure Controller with narrow throttling range, controlling the air pressure in the line to the receiver at a value corresponding to the value of the quantity under measurement.

When the Metavane System is supplied as an automatic controller, a standard Bristol's Recording or Indicating Free-Vane Controller, either of the Throttling or Reset type, as required, is used as the receiver.

Electronic amplification of electric measuring and control impulses is now widely used for telemetering, and for remote automatic control. One way of doing this is to have a moving vane which is mechanically actuated from the control section of a control mechanism. Vane movement alters the electric field of two oscillation coils. An amplifier vacuum tube transmits control circuit impulses via an electric relay to a motorised gradual control valve.

This is a modified version of the well-known Elliott-Shotter equipment, the transmitting unit of which employs a variable coupled current transformer. The new equipment is now known by the name of 'Elliottol.' The input and output iron systems of the new transmitter are coupled by a single-turn coil of high conductivity material resembling a distorted figure of eight, which is rotated by the originating movement. The larger of the two loops of the '8' passes through the output iron system while the other, known as the 'reverse turn,' traverses an air gap in the input iron system. The input and output elements are thus linked electrically to an extent depending upon the angular position of the coupling coil. The shape of this member is such as to produce an output current proportional to deflection and, in cases where it is required to add together the outputs of two or more transmitters, zero deflection of each transmitter gives zero current.

Temperature compensation is achieved by a magnetic shunt across the air gap of the energising coil.

The receiving element used with the transmitter is essentially a milliammeter. Typical instruments are shown on Fig. 5, showing a typical instrument panel for remote indication of measured values. Circular instruments are inserted in a flow sheet of the chemical plant. Two control units are also incorporated.

Graphic Control Panels

This new development for the chemical industry can only be briefly described. Simultaneously developed in the U.S.A. and in England, graphic panels might become standard at a later time for larger oil refinery plants, and for certain very elaborate chemical processes. Just for interest, Fig. 6 shows a large coloured graphic control panel for oil refining, developed in the U.S.A. It is typical of several other makes. Space does not permit to go into detail, but similar

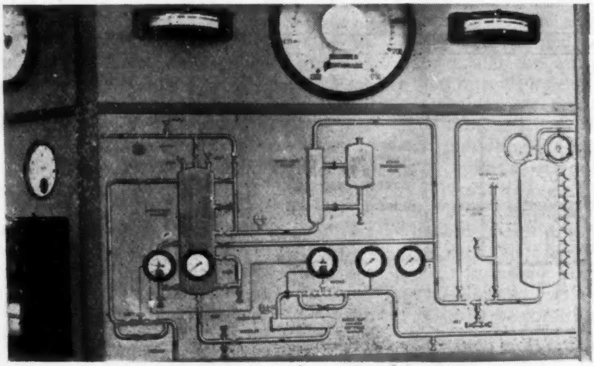

Fig. 5.—Example of a graphic control panel *(Courtesy of Elliott Brothers (London) Ltd.)*

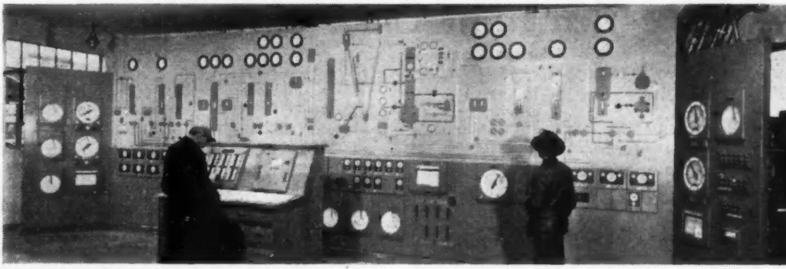

Fig. 6.—Colorographic control panel for Houdriflow unit for an American refinery
(Courtesy of Minneapolis-Honeywell Regulator Co., Philadelphia, U.S.A. (British associates: Honeywell-Brown Co., Ltd., Perivale, Middlesex)

panels are in course of development for chemical installations in this country. The photograph shows clearly how measurement and automatic control is centralised in a special control room, allowing 'engineered remote control' or 'plant robotisation.'

A British-made central graphic control desk, using electronic amplifiers on trays, is similar. Briefly, electrical impulses from various measuring and control points in the plant are electronically amplified. The electronic amplifier units can be separately withdrawn from the back of the graphic flow panel for inspection or servicing. Exchange of plug-in units is thus made easy. Re-adjustments of control setting can be performed by means of set knobs on the small compact indicator units, inserted in the graphic flow sheet, by the supervising engineer without leaving the control desk. Independent multi-point recorders on both sides, and a multi-point indicator on the right, allow precise checking of control results. It is claimed by makers of graphic panels that they provide undivided responsibility, and many other advantages over the conventional instrument panels. Whether these claims are justified will be seen in one or two years' time after the first graphic control panels in this country have proved their value and reliability.

Chemical Plant Application

It should be mentioned, however, that graphic panels are only required where working conditions make them not only necessary, but more suitable for automatic control and supervision of a plant. Graphic panels have been primarily developed for the American Oil Refinery Industry, but are now also used for chemical plants and are considered for the food industry. Graphic panels make chart recorders not superfluous, and they are usually necessary additions to mimic diagrams with inserted miniature indicators. Records can be required for starting up, for bringing instruments into sequence operation, and for irrefutable proof of happenings in the past.

Electronic-pneumatic System

There are at the present time apparently two schools of thought prevalent. One school prefers a pneumatic air system for use in all operations, but the other school points out that electric detecting and transmitting currents are preferable, because they operate with practically no time lags. Nevertheless, for practical purposes, instead of using fully electrically controlled elements a combined electronic-pneumatic system is used by the second school for graphic control panels, whereby the signals are electrically transmitted, but a special pneumatic-electric relay transfers the electric impulses into variations of output pressure of air, which latter operates the usual diaphragm control valves. Where necessary, these valves are equipped with valve positioners or special relays in order to ascertain correct valve position in spite of friction of the stem and gland packing, hysteresis of the diaphragm, etc.

The makers of electro-pneumatic systems claim also that the three settings for width of proportional band, reset time, and derivative time are entirely independent of each other. The explanation is that in mechanical pneumatic devices, mechanical link

[continued on page 127

The Brazilian Chemical Industry

Big Expansion Taking Place

DURING June, 1951, five new chemical companies were founded in Brazil, in Rio and S. Paulo, and seven of the existing companies have increased their capital by a total of £5,240,000.

One of the new companies is a subsidiary of the Monsanto Chemical Company, called the 'Monsanto S.A. Produtos Quimicos e Plasticos', with a capital of 40 million cruzeiros (£800,000), and formed to manufacture PVC and other products in Brazil. The parent company will hold 51 per cent of the ordinary shares which entitle the holder to vote, but Brazilians will subscribe 75 per cent of the total capital.

Briston Laboratories, of Syracuse, New York, and Wyeth Inc., of Philadelphia, have also formed Brazilian subsidiaries with the object of manufacturing penicillin in San Paulo. This product is already made on a small scale in Brazil.

Fuel Gas by Fermentation

Professor Renato de Faria, who has been studying methods of producing fuel gas by fermentation in Algiers and elsewhere, has said that the process could be usefully applied in Brazil. Fuel gas, he said, obtained from the fermentation of litter and straw, is a mixture of about 60 per cent methane and 40 per cent carbon dioxide, plus free hydrogen, with a heating power of 5,500 to 9,000 calories per cubic metre. As CO_2 is soluble in water the methane content can be raised by passing the mixture through water. For immediate use this treatment is indispensable. The best temperature for fermentation is 37°C., while below 10°C. microbian activity ceases. Ducellier, of the Algiers Agricultural School, noted that the straw of maize, wheat and oats gives over 300 cu. m. of gas per ton. Professor Renato de Faria is to continue experiments with bagasse of cane, rice, coffee and other substances in order to ascertain the yield of each.

Another suggestion, recently ventilated in the Rio press, is to use the residue of agave to produce animal fodder and cellulose. Brazil's output of sisal or agave fibre is about 25,000 tons annually, but only 3 per cent of the leaves are used. The residue, after shredding, can be passed through a press to expel the moisture, leaving a mass of fibre, husks and crusts. When this is broken up the fibre can be employed to manufacture cellulose, the remainder being used as cattle fodder, either immediately, or after drying. The Agronomical Research Institute of Pernambuco gives the chemical composition as: moisture, 11.84 per cent; protein, 10.84 per cent; starch, 6.62 per cent; extract of ether, 0.52 per cent; ash, 13.62 per cent; cellulose and others, 56.56 per cent.

The Executive has asked Congress for authorisation to acquire shares in the Cia. Nacional de Alcalis and guarantee a loan to the company. The official attitude is due to the difficulty of obtaining adequate supplies of barilla and caustic soda for the Brazilian chemical industry, which requires approximately 440,000 and 60,000 tons annually. The company, in order to produce economically, must acquire plant for a minimum output of 100,000 tons annually. An investment of £7 million will be required, of which £3 million will be subscribed by the Treasury, and the government will guarantee the loan approved by the Export-Import Bank, which must be increased from 5 to 15 million dollars. The Senate Financial Committee, in recommending the proposal, points out that the existing factories in Rio S. Paulo and Parana do not produce more than 12,000 tons yearly of caustic soda, and that consumption is expected to reach 90,000 tons within the next few years.

Synthetic Ammonia

The President of the Republic has authorised the Ministry of Agriculture to study plans for the manufacture of synthetic ammonia in Brazil. As the use of national coal (*see* CHEMICAL AGE, 28 April, 1951) is considered uneconomical, the following alternative sources are being considered: a factory to utilise air and water, receiving electrical energy from the hydroelectric station of San Francisco, now under construction; to employ the natural gas of the Aratu wells in Bahiá, or the residual gases from the 45,000 barrel oil refinery, which the government is to install at Cubatao, near Santos.

The third alternative seems to be meeting

with most favour. The President of the Petroleum Council recently consulted French bankers about the prospects of financing the installation of a factory to produce synthetic ammonia from the refinery gases. Their proposals, which are said to be satisfactory, have been submitted to Dr. Getulio Vargas for his approval.

The Minister of Finance has been authorised to organise a company, formed by private capitalists and the National Steelworks of Volta Redonda, to produce sulphur from coal pyrites. Laboratory experiments to extract sulphur directly from the pyritic rejects were satisfactorily completed in 1950 (*see* CHEMICAL AGE, 15 July, 1950). Brazil requires 70,000 tons of sulphur yearly, but will only receive 45,000 tons in view of United States' restrictions against exports. The National Steelworks alone has 500,000 tons of pyrites in stock in Santa Catarina. The project is to build a factory adjoining the coal-fields in that State. The National Steelworks will provide 50 per cent of the capital.

Analysis of Soaps

METHODS for the analysis of soaps, both standard methods (part 1) and methods of the International Commission for the study of fats (part 2) are given in B.S.1715 recently published.

British Standard methods are applicable to most types of soap products, but will not in all cases necessarily be applicable to the more specialised type of soap products, such as those containing potash or ammonia, soft soaps, liquid soaps, transparent soaps, super-fatted soaps, carbolic soaps, highly perfumed soaps, soaps containing synthetic detergents, and soaps containing per-oxygenated salts.

The document covers the sampling and preparation of samples for analysis, and gives methods of determination for the following:—

Loss on drying at 100-105°C., water, total fatty matter, alkali combined as soap, total alkai, titre, matter insoluble in alcohol, matter insoluble in water, free alkali, chlorides and unsaponifiable matter, etc.

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continued from page 125]

motions are used, for example, in connecting a proportional with an integral action, or with reset action. The Evershed system, for example, uses current values and it is possible to superimpose current changes from out-of-balance voltages, caused by deviations. The control valve air pressure is then proportional to the final output current, and a wide or narrow proportional band can be obtained electrically. It is claimed by the makers that the accuracy of the Evershed electro-pneumatic control system keeps well within 1 per cent. It is also claimed that the photocell used for setting integral time and derivative time has constant characteristics, and can be regarded as a sturdy element.

Panel Limitations

It has been pointed out by instrument makers that graphic panels also have limitations as to the maximum number of instruments to be assembled on a single panel. For example, where 120 controllers are required, it might be preferable to place, say, 30 controllers on a single cubicle, and to put four such cubicles in a small control room. Combination of a console and a graphic panel containing the mimic diagram have also been used.

This concludes this series of articles, giving a brief survey of development in instrumentation for chemical plants. The co-operation of many instrument-making firms for providing photographs and data is duly acknowledged.

W. T. Marchment (*Evershed & Vignoles, Ltd., London*). 'Some Developments in Electronic Instrumentation including Process Control.' Paper presented at Texas College, U.S.A., October, 1950.

E. P. Grace, Jnr. 'Process Variables at Your Desk.' Publ. : *Industry and Power*, Chicago, October, 1950.

A. V. Novak. Graphic Panels. '*Instruments*,' Pittsburgh, U.S.A. Nov., 1950, issue.

C. S. Comstock. 'Instrument Engineering in a large Chemical Plant.' Paper at Texas College, September, 1946.

R. J. Redding. 'An Outline of Some Remote Indication Methods.' Paper read Inst. of Electrical Engineers, Nov. 30, 1950. Publ. : *Instrument Practice*, London, Dec., 1950, issue.

Leo Walter and L. B. Lambert. The Instrument Manual, 1949. Publ. : United Trade Press, Ltd. London. Section on 'Automatic Control.'

E. J. Grace, Jnr. 'Future of Graphic Panels in Process Control.' Publ. : *Instruments*, April, 1951.

A. E. Krogh. 'Automatic Control of Flow in the Process Industries.' Publ. : *Instruments*, Pittsburgh, U.S.A. Journal, May, 1951, issue.

(*Previous articles in this series appeared in* THE CHEMICAL AGE *as follows*:—*Part I, 64*, 807; *part II, 64*, 885; *part III, 64*, 945; *part IV, 65*, 41.)

Publications & Announcements

A MONOGRAPH on malt amylases and their action on starch has recently been issued by Muntona, Ltd., of Bedford, in conjunction with Edward Fison, Ltd., of Ipswich. This is the first of a series to be published on malt and malt products, and it consists of a review of starch hydrolysis by enzymes, and of factors affecting malt amylase activity, an estimation of amylase activity, and a bibliography and references.

* * *

LONDON fogs, particularly those of the years 1873 and 1880, undoubtedly did much to stir the conscience of the public about the evils of smoke, and the first smoke abatement exhibition was held in 1881, in South Kensington, and was attended by 116,000 people. These are some of the facts revealed about development of smoke prevention during the last hundred years in the current issue of 'Smokeless Air' (No. 78), journal of the National Smoke Abatement Society.

* * *

RECENTLY brought out is an attractive booklet on jointings by Richard Klinger, Ltd., describing the specifications of various types of 'Klingerit' compressed asbestos jointing designed to stand up to a variety of conditions, pressure, heat, oil, etc. This booklet describes the components of each type of jointing and gives the recommended uses for each of them. A convincing series of graphs shows the resilience or compressibility at high and ordinary temperatures of 'Klingerit' jointing.

* * *

LIMESTONE is one of the most important raw materials in the production of iron and steel. In British blast furnace practice a considerable proportion of limestone is added to the burden to eliminate as much sulphur as possible. Lime is invaluable in chemicals, agriculture, non-ferrous metals, glass, ceramics, plastics and rubber manufacture, soap, greases, purification of coal gas treatment of water, sewage and effluents, and the purification of sugar. The wide range of applications of limestone, lime, and dolomite are discussed in an article in the July issue (Vol. 30. No. 349) of Edgar Allen News, published by Edgar Allen & Co., Ltd., Sheffield.

TUNGSTEN high speed steel, which for practical purposes can be regarded as an ordinary type of carbon steel, is appraised in an article by K. J. B. Wolfe in the 'Alloy Metals Review' (Vol. 8, No. 60), published by High Speed Steel Alloys, Ltd., Widnes, Lancashire. This is the first of two articles dealing with tungsten and molybdenum as high speed tool materials.

* * *

ACIDITY or alkalinity of a liquid expressed by the term *p*H is often not properly understood by those unversed in chemical terminology. A concise explanation is given in the current issue (No. 8) of the bulletin of the British Whiting Research Laboratories, Bedford. It is shown that *p*H values above 9.0 are found with good quality British whitings, but some precipitated calcium carbonates give extracts with higher values.

* * *

WIDESPREAD activities of Powell Duffryn, Ltd., and its allied companies are reflected by the broad scope and variety of the articles contained in 'The P.D. Review,' journal of the group. In the July issue subjects range from the erection of new oil storage tanks at Barry Dock by Cory Brothers & Co., Ltd.; 'Man's Friend the Elephant'; an account of the history and development of Liverpool; and the second of a series on the Queens of Egypt.

* * *

GEORGE Kent, Ltd., announce a new 'PL' type orifice for measuring the rate of flow of oils in pipe lines. The aim of its development, say the company, has been to obtain the most stable coefficient over the longest range of Reynolds numbers, and the orifice, which is available in two forms, gives a coefficient of discharge which is unaffected by wide variations in the viscosity of the fluid passing through it. The two forms of fitting of the orifice may be used for either horizontal or vertical pipes. The orifice plate is made of stainless steel and is designed and made to give the required differential pressure at the specified maximum flow. This differential pressure is transmitted to the recorder by way of two connecting pipes, using seals if necessary to facilitate this in the case of the heavier oils. The thickness of the orifice plate varies from 1/16 in. upwards, according to the oil pipe diameter.

The Chemist's Bookshelf

A SHORT GUIDE TO CHEMICAL LITERATURE. By G. M. Dyson. Longmans, Green and Co., Ltd., London. 1951. Pp. 144. 8s. 6d.

This book lists and describes the literature of use to chemists, and gives instruction in the methods of using this literature.

As was perhaps natural, the reviewer first looked for the name of this journal in the index, and turned to the page cited, to find the statement, 'All these, together with such ephemeral papers as THE CHEMICAL AGE . . . provide a forum for the exchange of news and the discussion of views on current affairs of chemistry'.

While the author uses the word 'ephemeral' in the bibliographical sense—*i.e.,* to denote a journal which has as its primary functions the dissemination of news, the publication of personal views and the discussion of topics of professional interest—it is not a happy choice of words. This is not, moreover, the only portion of the book which would mislead those not familiar with chemical literature who are seeking guidance.

Adequate classification of the vast range of chemical literature presents a serious problem, and it is doubtful if any one person is sufficiently acquainted with all branches of it to be invariably reliable in indicating its precise nature. Dr. Dyson is probably completely sound on the literature with which his researches have made him familiar. When he steps outside this, he is on less secure ground.

Thus, in the field of analytical chemistry, *Analytica Chimica Acta* is omitted from the list of research journals, but is included among the textbooks and special works of reference, being described as an *abstract* series. Again, in stating that *Mikrochemie* is now continued as *Mikrochimica Acta,* Dr. Dyson is incorrect, the reverse being the case.

No clear indication is given that *Z. anal. Chem.* is a research journal, the use of the term 'survey' giving the impression of a review journal. The inclusion of Welcher's *Organic Analytical Reagents* under *organic* analytical procedures is quite misleading. There are several serious omissions in the lists of textbooks and works of reference.

To turn to a completely different branch, the *Review of Scientific Instruments* is not mentioned under apparatus, nor is any reference given to the valuable section on 'Instrumentation' which appears monthly in *Analytical Chemistry.*

Classification of the more general journals also appears to have given trouble. There seems no reason for the inclusion of *Chemical Reviews* and *Quarterly Reviews* in a section separated by twelve pages from *Discovery* and *Endeavour.* And few scientists would primarily regard *Nature* as a news organ. No reference appears to be made to the Royal Institute of Chemistry *Journal* or *Monographs.*

Most startling of all, the only index reference to the *Annual Reports* leads one to the section on methods of synthesis and extraction, in the Chapter on Reference Works on Medicinal Chemicals; although, in fact, there is in the text another mention, in the section dealing with the method of making a search of the literature of physical chemistry.

All of this is not to say that Dr. Dyson has failed to provide a useful introduction to the literature for the student of chemistry, but rather to stress that in using the book it must always be borne in mind that the specialist must, by the nature of things, depend on his own efforts in the long run; though he may build up his own body of knowledge on a foundation which can well be laid down from this book. As a useful guide for the beginner through the bewildering mazes of essential library work this book will undoubtedly be of service.

From the point of view of production it is felt that there is too little contrast between the Clarendon type used for the titles of books and journals and the normal type of the book. Since titles are so frequent throughout the text, this unfortunately results in blotchiness rather than clarity.—W.

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• HOME •

Compressed Fluorine Gas

The achievement of compressing fluorine gas into steel cylinders at 400 p.s.i. has been accomplished by the Imperial Smelting Corporation at its Avonmouth works. Methods of handling this highly reactive element were developed in America, Germany, and this country during the war, but the corporation is the first firm in the U.K. to offer the gas in this form as a commercial proposition.

New Laboratories

Opening of larger laboratories and the inauguration of a technical service and information bureau is announced by Dr. M. A. Phillips and associates. The technical departments are at 14 Western Road, Romford, Essex (Telephone: Romford 6992 and 5410). Administrative and secretarial headquarters of the organisation are at 115 High Holborn, London, W.C.1.

Isotopes in Industry

Results obtained by the application of radioactive isotopes to industrial purposes were described by Swedish, American, French and British scientists in the concluding session of the international conference which ended at Oxford on 20 July. Work in medicine and agriculture was also discussed among the 94 papers read by the representatives of 21 countries, besides Britain.

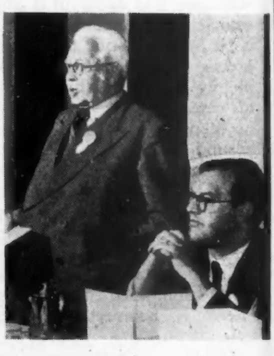
Anglo-American Carbon Project

Formation of a new jointly owned company in the U.S.A. is announced by Powell Duffryn Carbon Products, Ltd., a subsidiary of Powell Duffryn, Ltd., which has entered into an agreement with the Great Lakes Carbon Corporation of New York. The new company, the British American Carbon Corporation, will be the sole producer in the U.S.A. of carbon and graphite manufactured directly from coal by the Powell Duffryn 'Delanium' process, and its products will include specialities developed in this country by Powell Duffryn Carbon Products, Ltd.

New Scrap Prices

Following increases in the prices of virgin lead and zinc, the Minister of Supply (Mr. George R. Strauss) has made an Order increasing the maximum prices of the classes of non-ferrous scrap and secondary metal which contain the two metals. The Order also brings brass ingots and billets under price control for the first time, but no commission will be payable on the sales of these items. In addition it re-defines re-melted lead, and reduces the price for clean bright untinned copper wire and commutator bar. The Order, the Non Ferrous Metals Prices (No. 6) Order—Statutory Instrument 1951 No. 1318 came into force on 23 July.

Mr. Wilfred Beswick, chairman of the Power-Gas Corporation, Ltd., unveiling a commemoration stone to mark the building of the new South works



Dr. Rambush, vice-chairman, speaking at the Power-Gas golden jubilee luncheon on 13 July

· OVERSEAS ·

Idaho Sulphuric Acid

Firms in Idaho, America's largest producer of silver and zinc, are to install plant for the recovery of sulphur from smelting operations, for conversion into sulphuric acid and fertilisers. In recent years America's recovery of sulphuric acid as a by-product from copper, lead and zinc plants, is reported to have been between 600,000 and 900,000 tons annually.

Monsanto Phosphorus Plant

After three years of prospecting in the Rockies to see if mineral deposits, power and transportation facilities were amenable to the installation of plant, the Monsanto Chemical Company have decided to go ahead and build an elemental phosphorus plant at Soda Springs, Idaho. The plant will start out with one electric furnace, and later more. Construction is to start within a few months, and operation is planned by the end of 1952.

American Acetone Output

Acetone output from isopropyl alcohol and fermentation processes reached the high figure of 215,000 tons in America last year, as compared with 185,000 tons in 1949. Most of this production went to cellulose acetate manufacturers and the chemical, paint and lacquer coating industries. A new process for making phenol from benzene without sulphonation, to be used by the Allied Chemical & Dye Corporation, may now increase supplies of acetone, as it is an important by-product of the process.

DDT in U.S.A.

Production of the two most widely used insecticides—DDT and benzene hexachloride (BHC)—is higher than ever in America this year. DDT production will, according to reports, reach an estimated 40,000 tons, while BHC with a 12 per cent gamma isomer content will probably reach 42,500 tons. Some producers are marketing BHC with a 36 per cent gamma isomer content, and one sells pure gamma isomer under the tradename of 'Lindane'. Trends appear to be towards higher proportions of the gamma isomer, but the problem of disposal of waste isomers is serious. A partial solution is to crack them to trichlorobenzene and convert this to trichlorophenol. This is an intermediate for 'Hexachlorophene', a potent germicide.

Canada Makes Laminates

The Panelyte division of the St. Regis Paper Co. (Canada), Ltd., announces that production of laminated plastics has commenced at its new plant at St. Johns, Quebec. A steady increase in output is expected until capacity operations are reached this fall. The new plant is designed to supply requirements of the Canadian market for industrial, refrigeration and decorative 'Panelyte', the company's trade name for its laminated plastics. Heretofore the market had been served by the Trenton, New Jersey, plant.

Synthetic Textile Development

Possible expansion of the operation of Dominion Textile Co., Ltd., into the field of synthetic textiles was foreseen by G. Blair Gordon, president of the company, in his remarks to the shareholders at the annual meeting of the company. The management, he said, was following closely the developments in the synthetic field and it would not be an unnatural move if, some time in the future, they were to assume a broader position in this connection than they have occupied up to the present.

Canadian Nylon Foreshadowed

Purchase by Canadian Industries, Ltd., of 1,500 acres of land between Brockville and Prescott, Ontario, foreshadows commencement of the manufacture in Canada of nylon raw materials. In a statement, the company described the purchase as 'a possible site for a multi-million-dollar commercial chemicals plant', but added that there are still a number of problems to be solved, and it may be several months before the company would be able to make public additional details. Earlier, the company had commented that the rapid expansion of the market for nylon yarn and staple fibre was causing it to consider the manufacture of yarn and staple fibre. Defence Production Minister, C. D. Howe, has listed nylon intermediates as among industrial chemicals to be manufactured in Quebec and Ontario as part of a chemical expansion programme now under way. He mentioned that chemical expansion to cost over $46 million had been approved for priority assistance in these provinces.

British Chemical Prices

LONDON.—The call for supplies has remained at about the recent level during the past week although the movement against contracts has been restricted by holiday influences. In all sections of the industrial chemicals market prices have continued firm. An active demand is reported for the barium compounds, arsenic, hydrogen peroxide and the solvents, while the higher values for the white and red leads have not affected the demand for these products. Trading conditions in the coal tar products market are unchanged with the home demand absorbing any available parcels. Crude carbolic acid is particularly strong and the demand for cresylic acid exceeds offers.

MANCHESTER.—A steady movement of supplies under contracts has again been reported on the heavy chemical market during the past week. Business has been fair both for home consumption and for shipment. Trading conditions although quieter, have not so far been affected to the same extent as usual by annual industrial holidays. The alkalis generally, as well as the potash and ammonia compounds and a wide range of other heavy chemicals, are being called for in good quantities. Most of the leading tar products are in brisk demand.

GLASGOW.—Owing to the major consuming area being on holiday, demand for the general run of chemicals has to some extent slowed down. There has been a noticeable increase in the supply of some of the carbon products which is welcome after months of scarcity. The general position is quite healthy. There has been no outstanding change in the export market and the demand has remained more or less steady along normal lines.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £110 ; 80% pure, 1 ton, £116 ; commercial glacial 1 ton, £129 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £166 per ton.

Acetone.—Small lots : 5 gal. drums, £105 per ton ; 10 gal. drums, £100 per ton. In 40/50 gal. drums less than 1 ton, £85 per ton ; 1 to 9 tons, £84 per ton ; 10 to 50 tons, £83 per ton ; 50 tons and over, £82 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 4s. 7½d. per proof gallon ; 5000 gal. lots, d/d, 4s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £133 per ton ; 10 gal. drums, £128 per ton. In 40/45 gal. drums : less than 1 ton, £113 per ton ; 1 to 9 tons, £112 per ton ; 10 to 50 tons, £111 per ton ; 50 to 100 tons, £110 per ton ; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER : Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER : £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £5 15s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £88 and £86 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 7d. to 3s. 8½d. per lb. Crimson, 4s. 1d., to 5s. 6d. per lb.

Arsenic.—Per ton, £44 5s. to £47 5s., ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £30 per ton, bag packing.

Barium Chloride.—£40 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £33 5s. per ton d/d ; 2-ton lots, £33 10s. per ton d/d.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £60 10s.; in 1-cwt. bags; commercial, granular, £39 10s.; crystal, £42; powder, £43; extra fine powder, £44; B.P., granular, £48 10s.; crystal, £51; powder, £52; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £68; crystal, £76; powder, £73 10s.; extra fine powder, £75 10s.; B.P., granular, £81; crystal, £88; powder, £85 10s.; extra fine powder, £87 10s.

Butyl Acetate BSS.—£263 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£250 per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Per lb., d/d buyers' premises, for 5 cwt. or over, anhydrous, 1s. 9d. plus 10%, other, 1s. 9d.; 1 to 5 cwt., anhydrous 1s. 9½d. plus 10%, other 1s. 9½d. Higher prices for smaller quantities. All subject to a trade discount of 5%.

Cobalt Oxide.—Black, delivered, 11s. 2d. per lb.

Copper Carbonate.—MANCHESTER: 2s. 5d. per lb.

Copper Chloride.—(63%), d/d, 2s. 9d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63%), d/d, 2s. 8d. per lb.

Copper Sulphate.—£88 12s. 6d. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £12 12s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £174 per ton.

Formaldehyde.—£33 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1,260 s.g. £14 9s. 0d. per cwt.
Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 3d. to 2s. 6d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £116 per ton. 35% wt. £146 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 21s. 4d. per lb. in cwt. lots.

Iodoform.—24s. 9d. per lb. in cwt. lots.

Iron Sulphate.—F.O.R. works, £3 15s. to £4 5s. per ton. Bags free.

Lactic Acid.—Pale tech., 44 per cent by weight £130 per ton; dark tech., 44 per cent by by weight £110 per ton ex works; Usual container terms.

Lead Acetate.—White: £146 10s. per ton.

Lead Carbonate.—Nominal.

Lead Nitrate.—£150 per ton.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £198; orange lead, £210. Ground in oil: red, £219; orange, £231.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £204 per ton. Ground in oil: English, under 2 tons, £220.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82%, ton lots, d/d, £22 to £25 per ton.

Litharge.—£198 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s.; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 10s. 8d.; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 2d. per gal. ; pyridinised 64° O.P. 100 gal., 4s. 4d. per gal.

Nickel Sulphate.—Deld. buyers U.K. £140 10s. per ton.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £146 per ton, packed in 5-cwt. lots, packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d. according to grade for 1-ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £67 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 2½d. per lb.

Potash, Caustic.—Solid, £88 10s. per ton for 1-ton lots ; flake, £105 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 10¾d. per lb. ; ground, 11¾d. per lb., for not less than 6 cwt. ; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £88 10s. per ton for 1-ton lots, ex store ; hydrated, £81 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £16 10s. per ton.

Potassium Iodide.—B.P., 18s. 5d. per lb. in 28 lb. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 6½d. per lb. ; technical, £8 3s. per cwt. ; for 5 cwt. lots.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 7d. to 2s. 10d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £21 12s. 6d. per ton d/d. (4 ton lots).

Sodium Acetate.—£70 to £75 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9d. per lb. ; anhydrous, 9¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 19s. 8d. per lb., in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £114 ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £23 per ton.

Sodium Nitrite.—£29 12s. 6d. per ton.

Sodium Percarbonate.—12½% available oxygen, £8 4s. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £34 10s., anhydrous, £73 ; tri-sodium, crystalline, £36 10s., anhydrous, £70.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £27 per ton, d/d, in drums ; broken, £27 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £57 12s. 6d. per ton ; pea crystals, £35 7s. 6d. per ton d/d station in kegs ; commercial, £22 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £20 4s. 6d. to £22 9s. 6d. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £15.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d (56-lb. /112 lb. bags), £115 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £207 10s. ; green seal, £206 10s. ; red seal, £205.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 6¼d. to 3s. 8d. per lb. Crimson, 3s. 6¾d. to 4s. 9¾d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Off colour, ex store. Imported £13 10s per ton. Extra white bleached ex store, £16.

Cadmium Sulphide.—About 20s. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£67 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 1s. 9⅛d. to 2s. 3d. per lb. ; dark, 1s. 8¼d. to 2s. 1¼d. per lb.

Lithopone.—30%, £62 10s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £15 4s. 6d.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. Special No. 1, £25 14s. 6d.

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £29 15s. per ton. Chilean industrial for 6-ton lots £29 15s.

Coal-Tar Products

Benzol.—Per gal, ex works : 90's, 3s. 8¼d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 5s. 8d. MANCHESTER : Crystals, 1s. 6¼d. to 1s. 8d. per lb., d/d crude, 5s. 9d., naked, at works.

Creosote.—Home trade, 8d. to 10½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 7¾d. to 10d. per gal.

Cresylic Acid.—Pale 98%, 5s. 8d. per gal. ; 99.5/100%, 6s. American, duty free, for export, 10s. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 2½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 8d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 2s. 3d. to £29 5s. 9d. per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £60 to £70 per ton. F.O.B.

Pitch.—Medium, soft, home trade, 115s. per ton f.o.r. suppliers' works ; export trade, 135s. per ton f.o.b. suppliers' port. MANCHESTER : £6 15s. f.o.r.

Pyridine.—90/160°, 27s. 6d. per gal. MANCHESTER : 26s. to 30s. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 1½d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton ; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal. ; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediate and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—3s. 6d. per lb. d/d.

o-**Cresol** 30/31° C.—1s. per lb. d/d.

p-**Cresol** 34/35° C.—3s. 6d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb. ; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb. ; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

INDUSTRIAL CHEMICALS, LTD., London, W.C. (M., 28/7/51). 30 May, £500 debentures part of a series already registered; also 31 May, £500 debentures part of a series already registered. *£5,000 debentures. 17 October, 1950.

NOSO PRODUCTS, LTD., Cardiff, chemical products merchants, etc. (M., 28/7/51). 21 May, debenture, to Barclays Bank Ltd., securing all moneys due or to become due to the bank; general charge.

New Registrations

Reid, Rowlett & Co., Ltd.

Private company. (497,765). Capital £100. Manufacturers, refiners, importers and exporters of and dealers in chemicals, drugs, medicines, pharmaceutical products, fertilisers, etc. Directors: R. C. Fielder, P. S. Reid, and E. W. F. Rowlett. Reg. office: 35 New Broad Street, E.C.2.

A. H. Walker (Acton) Ltd.

Private company. (497,498). Capital £1,000. Manufacturers of and dealers in chemicals, drugs, gases, fertilisers, etc. Directors: A. H. Hawkins, E. Cackett. Reg. office: 6 The Broadway, Gunnersbury Lane, Acton, Middlesex.

Company News

Eaglescliffe Chemical Co., Ltd.

An offer to acquire by a share exchange the capital of E. P. Potter & Co., Ltd., chemical manufacturers of Little Lever, near Bolton, has been made by the directors of the Eaglescliffe Chemical Co., Ltd., Stockton-on-Tees. For each £10 six per cent cumulative preference of Potter's there is an offer of 10 six per cent £1 Eaglescliffe preference. For Potter's £10 ordinary, 26 Eaglescliffe 5s. ordinary units are offered. The total of new Eaglescliffe capital involved, if the proposals are accepted, is not expected to exceed £44,000.

Lewis Berger (Great Britain), Ltd.

New production and sales records are revealed in the report for the year ended 31 March, 1951, of the Lewis Berger group. Trading profits were £905,766 (£801,450). Newly installed machinery and plant bought at high prices required an increased depreciation provision. Net profit after deduction of minority interests and servicing the £1 million of Loan stock issued in May, 1950, is £362,316. A final dividend of 17 per cent on the doubled capital is recommended.

The Distillers Company

Consolidated manufacturing and trading profits of the Distillers Company and its subsidiaries for the year ended 31 March expanded by £5.1 million from £12,837,691 to £17,934,520. A final dividend of 7.8d. per 4s. unit, or 16¼ per cent, to make a total of 22½ per cent on the £22,589,770 ordinary capital is recommended.

New Gas Research Centre

A SECOND research centre has been set up by the Gas Council at the Nechells Gasworks, Birmingham, the work of which will be mainly concerned with the complete gasification of coal. This centre will be administered by the West Midlands Gas Board on behalf of the council and its director will be Dr. F. J. Dent, present assistant director of the Gas Research Board.

This follows upon the announcement in September last that the Gas Council had set up a Research Committee, under the chairmanship of Sir Edgar Sylvester, chairman of the Gas Council, who had been joined by two eminent scientists—Sir Robert Robinson and Sir Cyril Hinshelwood. It was also then stated that the existing laboratories of the North Thames Gas Board were to be the nucleus of the Gas Council's London research station.

Dr. Dent has been closely concerned with the experiments upon complete gasification which have been conducted at the Poole Research Station. Great importance is attached to this particular field and the Gas Council has decided that this work can be accelerated at Birmingham.

Chemical & Allied Stocks & Shares

STOCK markets suffered a further reaction, due mainly to caution by buyers who have been awaiting international events, and this week there was a fair amount of selling on suggestions that the Chancellor of the Exchequer may propose some measure of profit restriction and dividend limitation. Mr. Gaitskell's speech on economic affairs will have been made by the time these notes are in print.

Expectation that legislation in respect of profits and dividends is unlikely, appeared to have gained ground, but as regards dividends strict limitation might be requested although at the time of the Budget the Chancellor stated that he was not opposed to moderate increases.

June trade figures have provided a further warning of the need to expand exports if gold and dollar reserves are not to decline. Inflation danger and the threat of growing shortages at home generally, seem likely to become more marked as increasing materials and goods are absorbed by rearmament and export trade. Another factor which tends to keep markets in check is growing talk of the possibility of a General Election in the autumn. British Funds have moved back despite the over-subscription of the £75 million 3½ per cent Gas Stock issue.

Moderate Changes

Chemical and allied shares receded with the general trend of markets. There have been some sharp declines from levels touched about three weeks ago, but in most cases movements on balance compared with a month ago have been moderate. Imperial Chemicals are 51s. 3d. compared with 52s. 6d. a month ago. Monsanto have come back on the month from 28s. 6d. to 27s., Fisons strengthened from 28s. 6d. to 29s. 6d., Albright & Wilson at 22s. 3d. were within a few pence of the level a month ago.

W. J. Bush at £6 remained firm on the financial results, and Hardman & Holden at 28s. 1½d. have also been under the influence of the good impression created by the results. F. W. Berk at 7s. 1½d. were little changed on balance, and Laporte Chemicals 5s. shares have kept steady at 12s. 6d. Burt, Boulton & Haywood were 31s. 10½d. on the 8 per cent dividend. The 4s. units of the Distillers Co. receded to 22s. 9d. despite the big rise in profits. The 22½ per cent dividend, an increase of 2½ per cent, was, however, below best market expectations which had ranged up to 25 per cent.

Borax Consolidated have kept steady at 36s. 3d., Turner & Newall eased to 98s. 1½d., Associated Cement to 106s. and despite the higher profits and dividend, Lewis Berger 4s. units came back to 20s.; while Goodlass Wall receded to 45s. 9d. awaiting permission from the Capital Issues Committee for the proposed 100 per cent share bonus.

Higher Dividend Hopes

United Molasses were back to 38s. 3d., although the company is reported to be making application to carry out its full share bonus plans, only part of which has so far been allowed. Staveley have changed hands fairly actively around 92s. 6d. Triplex Glass were fairly steady at 31s. 6d. on higher dividend hopes, as were G.E.C. at 93s., although realisation of these hopes may depend on whether a strict dividend limitation from industrial companies is requested.

British Xylonite were 92s. 6d., British Industrial Plastics 2s. shares 6s. 7½d., and British Glues (28s. 9d.) have remained fairly active as this is another instance where the market has been hoping for a higher dividend. Sangers at 21s. 9d. responded to the further interim payment, while Boots Drug have been active around 27s. 9d. in their 'ex' bonus form, but have not held best prices. United Glass Bottle held up quite well at 88s. 1½d., while in active dealings Rockware Glass 5s. shares, which were placed at 15s. 3d., have since advanced to 19s. 9d.

Oil shares took their cue from Anglo-Iranian which after falling below £5 at one time have since rallied to £5 5/16 on the more favourable news from Persia earlier this week. A sharp reaction in Courtaulds reflected the general trend in textile shares on fears of growing Japanese competition. Later, however, Courtaulds firmed up to 51s. 3d. in anticipation of further news of the company's new subsidiary in the U.S. being given at the annual meeting.

Factory Inspectors' Terms of Service

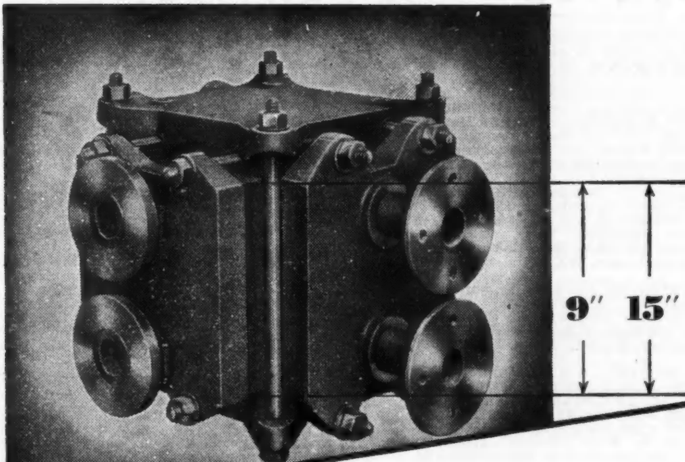
Questions in Parliament

THE shortage of factory inspectors was the subject of an exchange in Parliament between Dr. Charles Hill, Member for Luton, and Mr. Frederick Lee, Parliamentary Secretary to the Ministry of Labour and National Service. The number of inspectors employed at the present time was stated by Mr. Lee to be 327, or seven less than the number employed three years ago. In reply to a question by Dr. Hill urging a reconsideration of the terms of service of factory inspectors, with a view to raising this number, Mr. Lee said that there was a recruitment campaign in force at the moment, but he did not accept that the sole solution of the problem was to improve terms of service, since quality in this type of work was more important than quantity, and there was a great demand for this type of person throughout industry. Dr. Barnett Stross, Member for Stoke-on-Trent (Central) interjected here to say that there would still be too few inspectors, if their numbers were doubled or even trebled.

A statistical question then came from Dr. Hill, who asked how many of His Majesty's factory inspectors, as a result of the competitions held in 1950, held university degrees or similar scientific or engineering qualifications; how many have had practical experience since leaving the university; and how many have had experience in industry. Mr. Lee replied that of 24 people appointed since 1950, 18 held degrees, 10 had had practical experience since leaving the university, and 15 had had industrial experience. He could not undertake to say without notice whether this represented an improvement or a decline in the technical and other appropriate equipment of the applicants.

Sir H. Gaskell's Estate

SIR HOLBROOK GASKELL, O.B.E., formerly managing director of United Alkali Co., Ltd., and a director of I.C.I. 1934-46, son of the late Holbrook Gaskell, of Liverpool and Frodsham, left £217,618 gross, £212,079 net (duty paid £121,964).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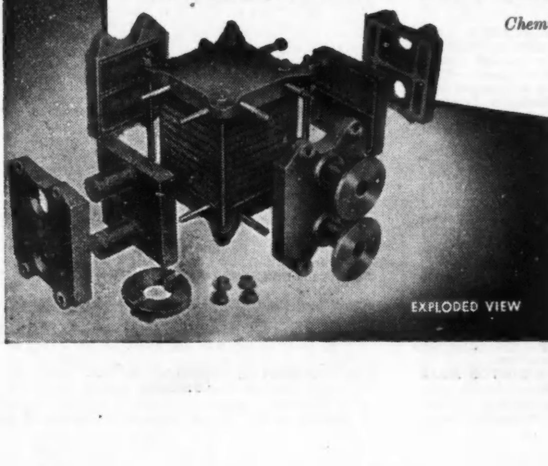
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Two **FILTER PRESSES,** chamber type, steam heated, centre fed with separate outlet taps.
14 various open top **STORAGE TANKS,** riveted capacities from 300 gallons to 9,800 gallons, last used for oil or varnish.

1½, 2½ and 3½ size belt-driven **DISINTEGRATORS** by Christy & Norris or Harrison Carter.

Size No. 3 Junior Hammamac **HAMMER MILL** with fan and cyclone, also No. 1 size Miracle **GRINDING MILLS** and one size 3W Miracle **GRINDING MILL.**

Robinson 3-sheet No. 1 size **CENTRIFUGAL DRESSING MACHINE** for dry powders, etc.
Gardner Size "G" **RAPID SIFTER** and **MIXER,** belt and gear driven.
Two Gardner **RAPID MIXERS** only, 40 in. long, 14 in. wide, one provided with small separate A.C. Motor.
Four **ROTARY BOWL MIXERS,** 5 ft. diam., cast iron built, inclined agitators, by Baker Perkins.

One Broadbent under-driven **HYDRO EXTRACTOR** self-balancing type, with self-contained A.C motor.

Two **FILTER PRESSES,** fitted recessed C.I. plates, 40 in square, 2½ in. thick, centre fed, to make 11 cakes per Press.

Kek **GRINDING MILL,** square pin type, with grinding discs 13 in. diam., including circular delivery bin with single outlet.

Large unjacketed **WERNER MIXER,** belt and gear driven, hand tipping, double "Z" arms, pans 53 in .by 45 in .by 36 in. deep.

No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCOPORATOR.** Low type, with C.I. built mixing chamber, 28 in. by 29 in. by 27 in. deep, with double "U"-shaped bottom which is jacketed, and double fish-tail or fin-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6 ft. by 4 ft. high to the to of the tipping screw.

No. 209 One **HORIZONTAL "U"-SHAPED MIXER** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

Further details and prices upon application

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Shaw Hydraulic **ACCUMULATOR,** 100 tons, cast iron, weight loaded type, with 3-throw pumps, mot. A.C. 415/3/50, latest design, new.
Two Shaw Hydraulic **PRESSES,** 60 tons, 4 columns platens, 3 ft. 6 in. daylight, 6 ft. 6 in. as new.

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Ingersoll Rand horiz. **COMPRESSOR,** 100 cu. ft. per min mot. A.C., 415/3/50.
Kestner **DRYER,** 16 heated rolls, hopper feed, size 6 ft. by 3 ft. by 4 ft. motorised.

URQUHART,
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8 COPPER-jacketed MELTING PANS, 18 in. diam. by 12 in. deep, fitted covers. mounted in M.S. frames 25 in. by 25 in. by 44 in. high, with flanged fittings, valves and steam traps. As new.

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KING'S PATENT AGENCY, LTD. (B. T. King, A.M.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free Phone: City 6161.

WORKING NOTICES

IT is desired to secure the full commercial development in the United Kingdom of BRITISH PATENT No. 587,568 which relates to "**RECOVERY OF PHENOL FROM PHENOL-BRINE MIXTURES BY DISTILLATION**" either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to **STEVENS, LANGNER, PARRY & ROLLINSON,** 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

IT is desired to secure the full commercial development in the United Kingdom of BRITISH PATENT No. 604,432 which relates to "**PROCESS FOR HYDROCARBON CONVERSION**" either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to **STEVENS, LANGNER PARRY & ROLLINSON,** 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

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